March 4, 1946

STEEL

The Magazine of Metalworking and Metalproducing

ESTABLISHED 1882

CHNOLOGY DEPT.

Europe, Asia, Africa and the Americas are Clamoring for the Products of our Mills and Factories

Here in the United States we now have the machinery, the equipment and the man power to supply most of the world's requirements.

This can be done quickly and with less confusion than was occasioned by conversion for war production—provided only that industry be released from unnecessary restrictions and permitted normal pre-war freedom of operation.

We, of the Apollo Steel Co., are optimistic. We believe in the American system and in industry's continued contribution to the advancement of the nation.

APOLLO

Manufacturing and Now Allocating
Hot Rolled Annealed Sheets
Galvanized Sheets
to our Friends and Customers

STEEL COMPANY

Main Office and Works, Apollo, Pa. Cradle of the Sheet Steel Industry
Pittsburgh Office, Oliver Building

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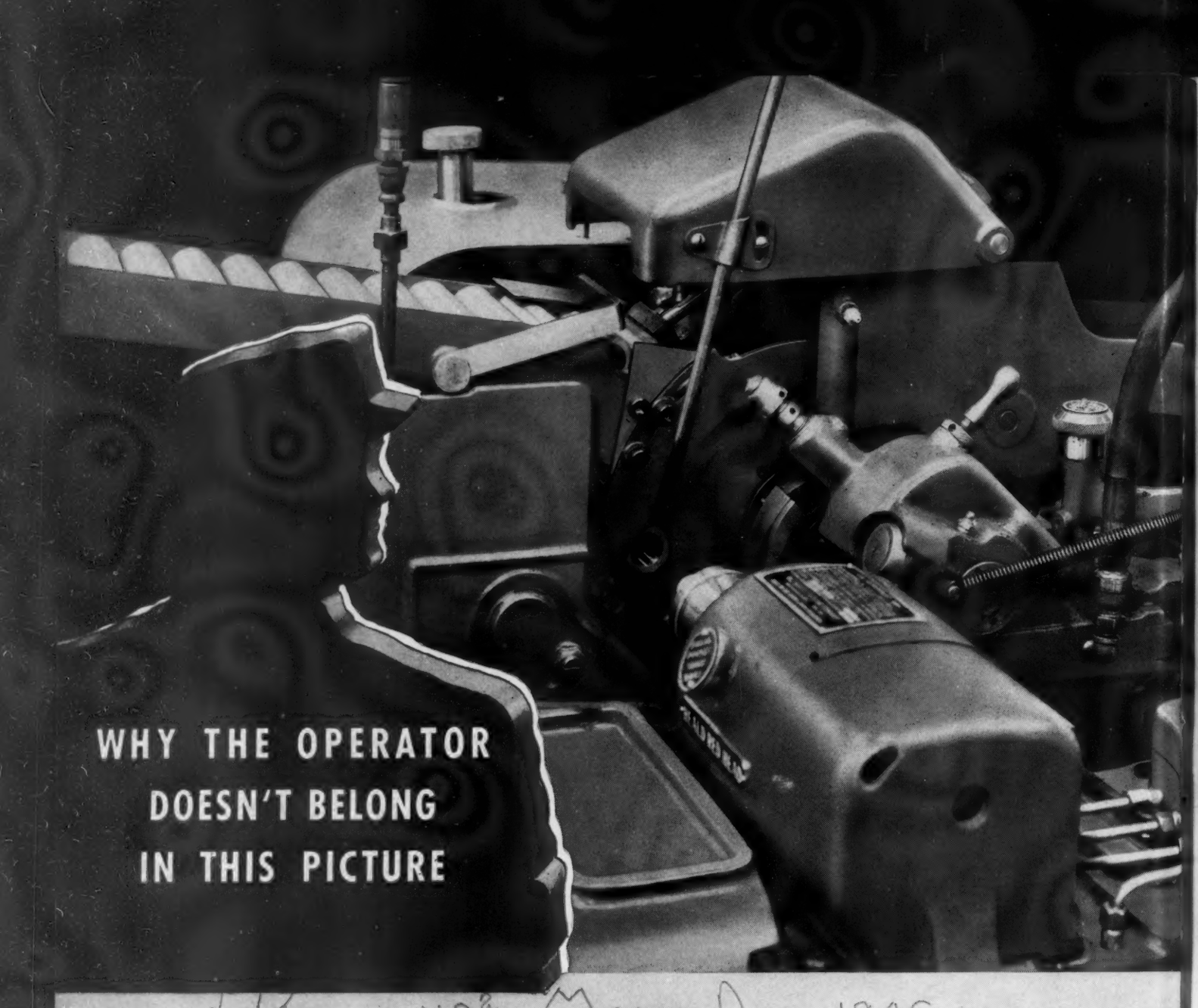
DETROIT



WHY THE OPERATOR DOESN'T BELONG IN THIS PICTURE

J.A. v. 118a Mar.-Apr. 1946

Another example of how Heald engineering helps you to cut costs—automatically!

In showing you this close-up of the Heald No. 81 Centerless Grinder, we've purposely left the operator out of the picture. Because in any internal grinding operation that requires both fine precision and high speed production, the operator is the *least important factor* when you use the Heald 81 Centerless.

Operation of this machine involves nothing more than placing the work in loading chutes. The machine does everything else. Loading, unloading, and even size control are *completely automatic*. One operator—and an unskilled one at that—can handle as many as six machines at once.

The Heald 81 Centerless will give you greater accuracy, too, with fewer rejects. Perfect concentricity is assured by the Centerless method of generating the bore from the outside diameter. Hole size is automatically held to tolerances of ten-thousandths by the Heald Size-Matic or Gage-Matic method.

On all types of work having a finished cylindrical O.D. up to 4½ inches—with straight, tapered, interrupted, open or blind holes—the Heald 81 Centerless will do the job faster, more accurately, and with less supervision.

This is typical of the kind of engineering that can easily mean the difference between profit and loss on any production line, especially in these days when so many other factors are beyond your control. At no obligation, a Heald engineer will gladly study your problem to help you get better production at lower cost. For details, write: The HEALD MACHINE COMPANY, Worcester 6, Mass.

HEALD

means finer precision
. . . Faster production

INTERNAL AND SURFACE GRINDING MACHINES • BORE-MATIC PRECISION FINISHING MACHINES

Jeb

with Mayari R

RHYMES WITH "FIERY"

This low-alloy, high-strength steel makes a hit all along the line—with designers and manufacturers, with shop men, with operators.

Mayari R, with its minimum yield point of 50,000 psi—nearly twice that of mild-carbon steel—makes possible greater strength with lighter sections. Dead-weight can be reduced as much as 40 per cent. That appeals to designers and manufacturers.

Shop men like working with Mayari R because it welds easily, and can be fabricated readily. And it is used as-rolled, without heat-treatment.

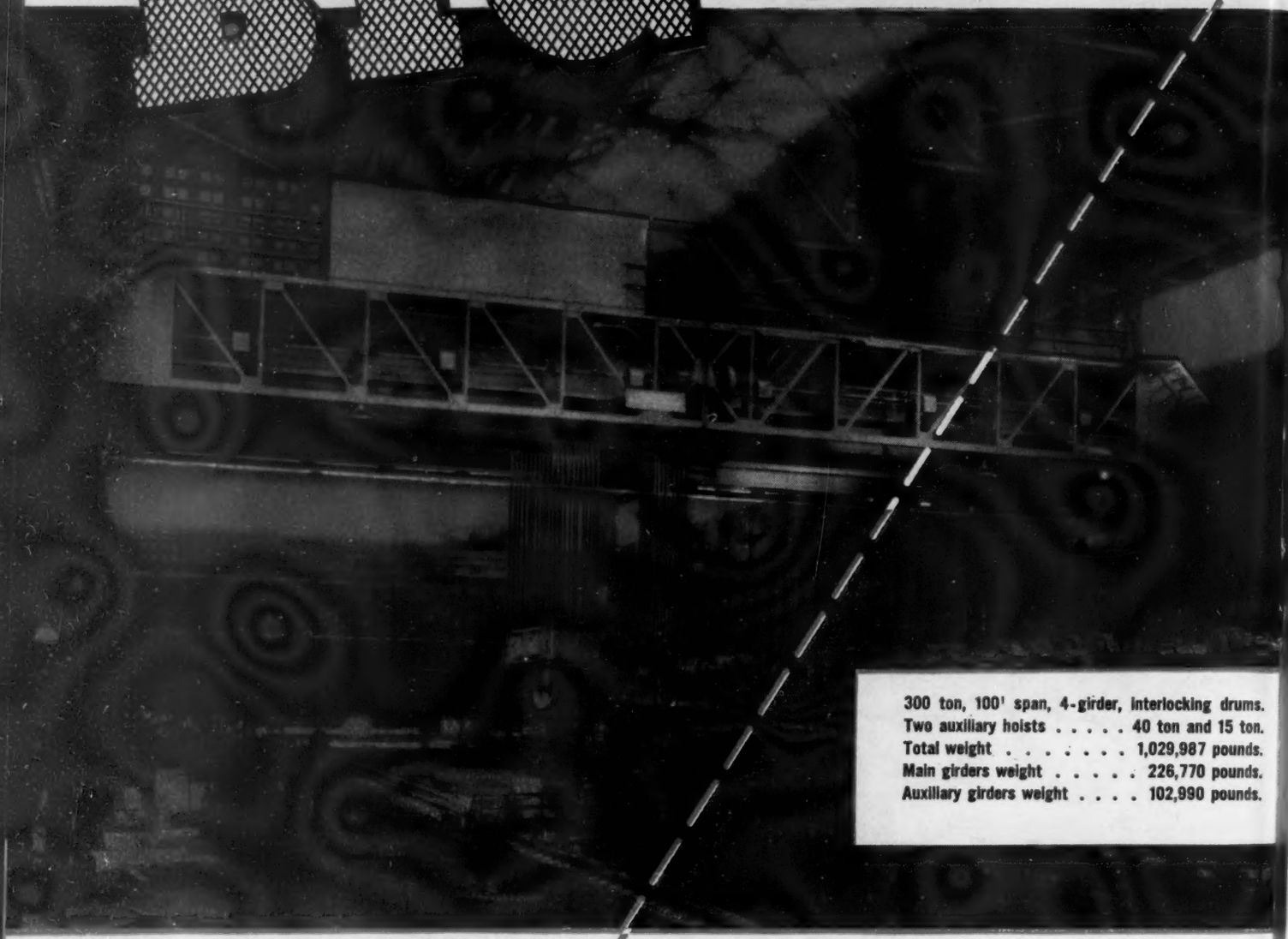
Railroad, bus, and truck operators can see important advantages in building transportation equipment with Mayari R—for by saving weight it provides more pay-load. And Mayari R's resistance to abrasion, impact and atmospheric corrosion means lower maintenance costs.

Look into Mayari R. Send for illustrated catalog. Address the nearest Bethlehem district office, or Bethlehem Steel Company, Bethlehem, Pa.

★ BETHLEHEM STEEL ★

Mayari R *makes it lighter... stronger... longer lasting*

BIG CRANES



300 ton, 100' span, 4-girder, interlocking drums.
Two auxiliary hoists . . . . . 40 ton and 15 ton.
Total weight . . . . . 1,029,987 pounds.
Main girders weight . . . . . 226,770 pounds.
Auxiliary girders weight . . . . 102,990 pounds.

Alliance builds *large* Cranes for handling *heavy* loads safely.

Here's a 300 ton, 100' span, 4-girder Alliance crane to move *completely assembled* Mill Housings. Two auxiliary hoists, 40 tons and 15 tons, add additional lifting and operating power.

Look over some of the heavyweights Alliance has built in the past couple of years:

4-Girder Ladle Cranes—Capacity 100 to 300 tons.
Soaking Pit Cranes—Capacity 10 to 60 tons.
Ingot Chariots—Capacity 5 to 60 tons.
Charging Machines—Capacity 1 to 20 tons.
Electro-hydraulic Cranes—Capacity 200 to 300 tons.
Ordnance Plant Cranes—Capacity 125 to 200 tons.
Forging Manipulators—Capacity 1 to 75 tons.
. . . plus several giants for the nation's shipyards.

During half a century's experience building the World's Largest Cranes, The Alliance Machine Company has developed many new Safety and Mechanical Features, which are now incorporated as standard practice in Steel Mill Cranes.

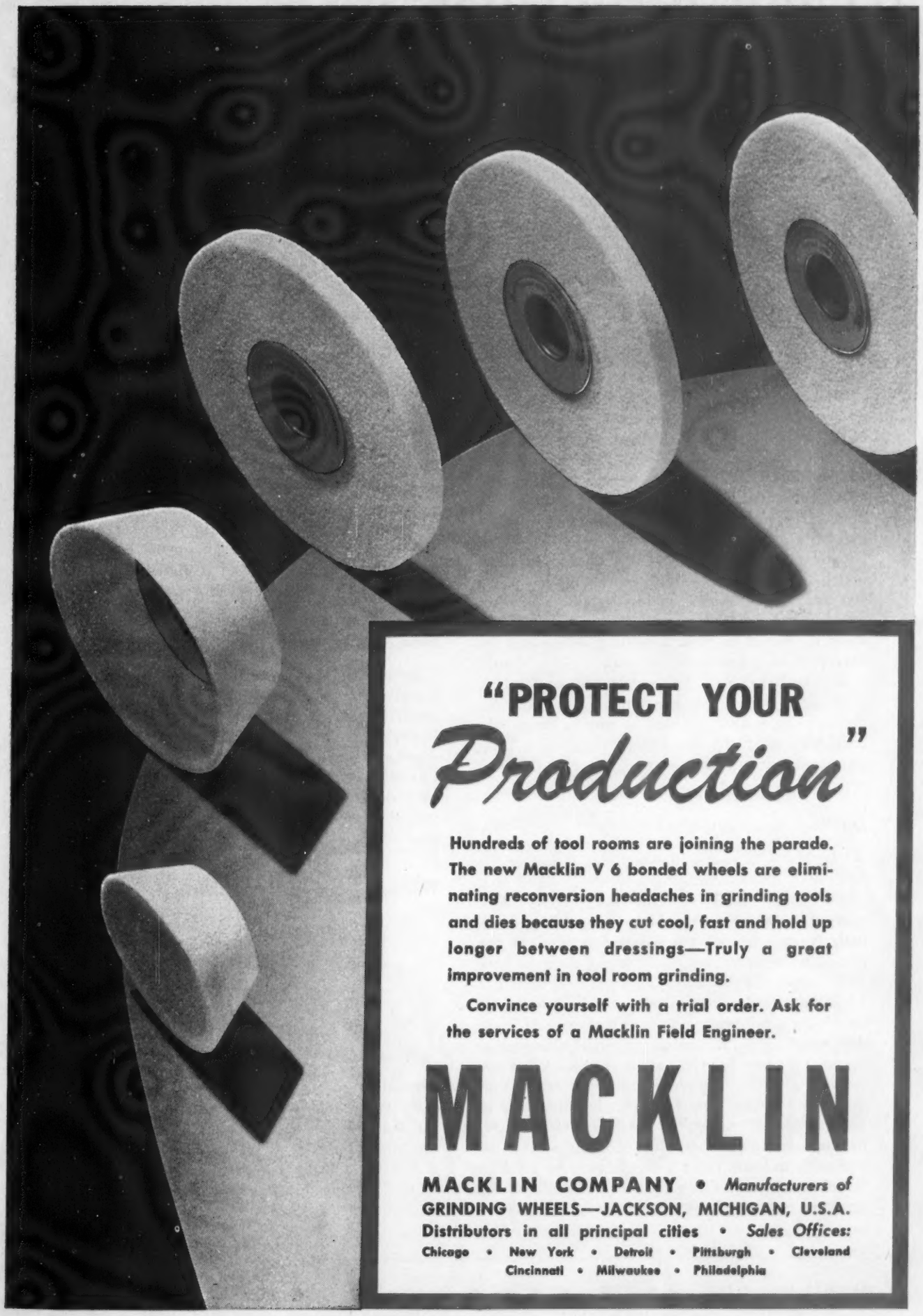
ARMY E NAVY

Consult Alliance on Cranes.

THE ALLIANCE MACHINE COMPANY, ALLIANCE, OHIO • PITTSBURGH, 1622 OLIVER BLDG.

LADLE CRANES • GANTRY CRANES • FORGING MANIPULATORS • SOAKING PIT CRANES
STRIPPER CRANES • SLAB AND BILLET CHARGING MACHINES
OPEN HEARTH CHARGING MACHINES

Alliance



"PROTECT YOUR *Production*"

Hundreds of tool rooms are joining the parade. The new Macklin V 6 bonded wheels are eliminating reconversion headaches in grinding tools and dies because they cut cool, fast and hold up longer between dressings—Truly a great improvement in tool room grinding.

Convince yourself with a trial order. Ask for the services of a Macklin Field Engineer.

MACKLIN

MACKLIN COMPANY • *Manufacturers of* **GRINDING WHEELS—JACKSON, MICHIGAN, U.S.A.**
Distributors in all principal cities • *Sales Offices:*
Chicago • New York • Detroit • Pittsburgh • Cleveland Cincinnati • Milwaukee • Philadelphia

BEHIND THE SCENES

with Shrdlu

The Boss Does A Job

It's about time for us to throw some more bouquets a few pages west of this position, aimed so they'll land on that canary-tinted page inhabited each week by Editor-in-chief Earl L. Shaner. His "As The Editor Views The News" page is one of the highlights of every issue, and the requests for reprints of this outstanding job of editorializing have reached unprecedented heights. So high, in fact, that we have had to make arrangements with our printing division to run off extra copies of this page each week. Top-flight industrialists all over the country have been writing in for additional copies, ranging from one to several hundred. One outfit wanted us to send copies to all its division managers; another wanted copies for all his customers. A third wrote in and asked for one additional copy each week—he'd been tearing his out of the issue and mailing it to his Congressman every week. Quotes like these make us feel real happy about it, "one of the most interesting articles that we have read on government activities. . . ." "Would it be possible to obtain 100 copies? We could make good use of it. . . ."—to mention just a couple. We *do* have copies available, and as long as the supply lasts, we'll be glad to send them along. Just drop us a note, and we'll take care of it.

Do You Need A VIPer?

War leaves its marks on everything, including the language. The GI slang, of which "GI" itself is a prime example, has become common parlance. And some of the smart cookies have been cashing in on both the novelty and the acceptance. One of the newest we've heard about is a young outfit in New York called VIP Service. The war engendered a whole lot of V.I.P.'s, who were very important persons. These folks got most of the breaks, in the early days, until the term became commonly accepted as meaning a person who had a good break. VIP Service says to us that they are in business to see that industrialists visiting New York get what they want in the way of hotel rooms, theater tickets, et al. Even nylons, they dig up (it says here). From what we've been able to learn, you not only have to be a V.I.P., but also you have to have the cash in hand and also know the right people to get in on these deals. Maybe these New York folks have all that. If so, they hold the VIP hand. (That's a joke, son!)

$40,000 Raise

Speaking of strikes, as most everyone has been doing lately, did you notice the one about the union whose members went on strike with a wage demand of $70,000 per month? No kidding. It was in the publishing business, too, but not here. The demanding citizens were Chinese printers. Seems they had been getting only $30,000 per month, and not being able to live on that, demanded the higher figure. At current exchange rates, that's a jump from about $15 American to $35 American per month. Hardly seems enough. Maybe we should publish a Shanghai edition, at those rates—but the sad part is that we have only a handful of readers in that area.

Who Wants To Buy A Where To Buy?

Because we have an average of somewhere around 6 readers per copy, a lot of you good readers may not have caught the Where-To-Buy section of our February 25 issue. If you can make use of a good directory showing where to buy all the products advertised in STEEL and somebody ahead of you on the route slip got the copy which should have come along with that issue, drop us a line and we'll be happy to send you an extra copy with our compliments.

This One's For Penny Pushers

We had Cmfwyp, our zinc-line camera man, set up the pennies adjoining and take a picture of them so we could refresh your memory on an old puzzle. Par for this course is less than one minute, and the problem is to move three coins and come out with the same pyramid, only in reverse order—with four coins in the top line, three in the second, two in the third and one on the bottom. If this job takes you more than a minute to figure out, you're in our class. The editors say anyone with an analytical mind should do it almost at once, but it took us about half an hour.

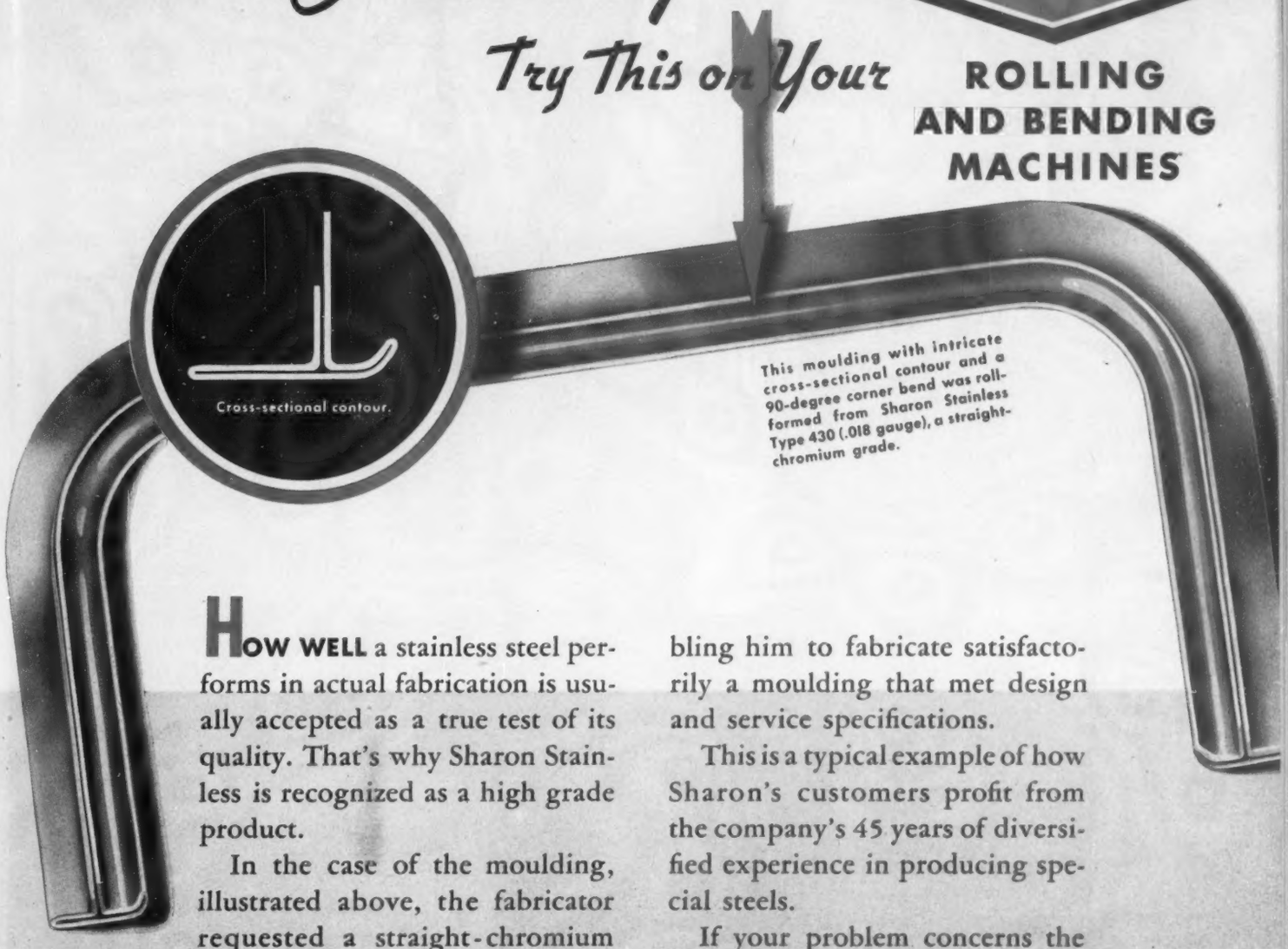
Vol. 118, No. 9, March 4, 1946, issue of STEEL, published every Monday at Cleveland, Ohio. Entered as second class matter at the post office, Cleveland, O., under act of March 3, 1879. U. S. and possessions, Canada, Mexico, Cuba, Central and South America, 1 year $6; 2 years $10; all other countries, 1 year $12. Current issues, 25c. Yearbook of Industry issue, $2.00.

(Editorial Contents—Page 85)

Test of Quality

SHARONSTEEL

Try This on Your ROLLING AND BENDING MACHINES



This moulding with intricate cross-sectional contour and a 90-degree corner bend was roll-formed from Sharon Stainless Type 430 (.018 gauge), a straight-chromium grade.

HOW WELL a stainless steel performs in actual fabrication is usually accepted as a true test of its quality. That's why Sharon Stainless is recognized as a high grade product.

In the case of the moulding, illustrated above, the fabricator requested a straight-chromium stainless steel that would bend flat on itself in the direction of rolling, then bend round to form a 90-degree corner angle.

Sharon Stainless solved the manufacturer's problem by enabling him to fabricate satisfactorily a moulding that met design and service specifications.

This is a typical example of how Sharon's customers profit from the company's 45 years of diversified experience in producing special steels.

If your problem concerns the choice of a proper steel or its fabrication, Sharon's metallurgical service is ready to assist you. Call or write the nearest Sharon Steel field office, or contact the company's home office for full details.

★ ***Producers of Excellent Quality*** ★

Stainless Steels • Alloy Steels • High Carbon Steels
Galvanite & Special Coated Products • Cooperage Hoop

SHARON STEEL CORPORATION

Sharon, Pennsylvania

District Sales Offices: Chicago, Ill. • Cleveland, O. • Dayton, O. • Detroit, Mich. Indianapolis, Ind. • New York, N. Y. • Philadelphia, Pa. • Rochester, N. Y. • San Francisco, Calif. • St. Louis, Mo. • Montreal, Quebec • Toronto, Ontario

Subsidiaries: Niles Rolling Mill Company, Niles, Ohio • Detroit Seamless Steel Tubes Company, Detroit, Michigan

50 Ton Load!...Operator is SAFE with Orton

COMPRESSION BRAKING

All Orton Diesel Cranes are equipped with a 3-speed *and* reverse transmission, located just behind the engine to control the speeds of *all* operations of the crane. When lowering a *heavy load*, the transmission is put in reverse and the load is lowered against compression of the engine exactly as you brake your car going down hill in second gear.

Just as in your car, the compression of the engine keeps the load from running away, with no possibility of dropping it. Fine control is secured with the friction brake, *which gives fine control only*, and is not relied upon for the safe holding of the load.

LOAD IS LOWERED AGAINST COMPRESSION OF ENGINE EXACTLY AS YOU BRAKE YOUR CAR GOING DOWN HILL IN SECOND GEAR

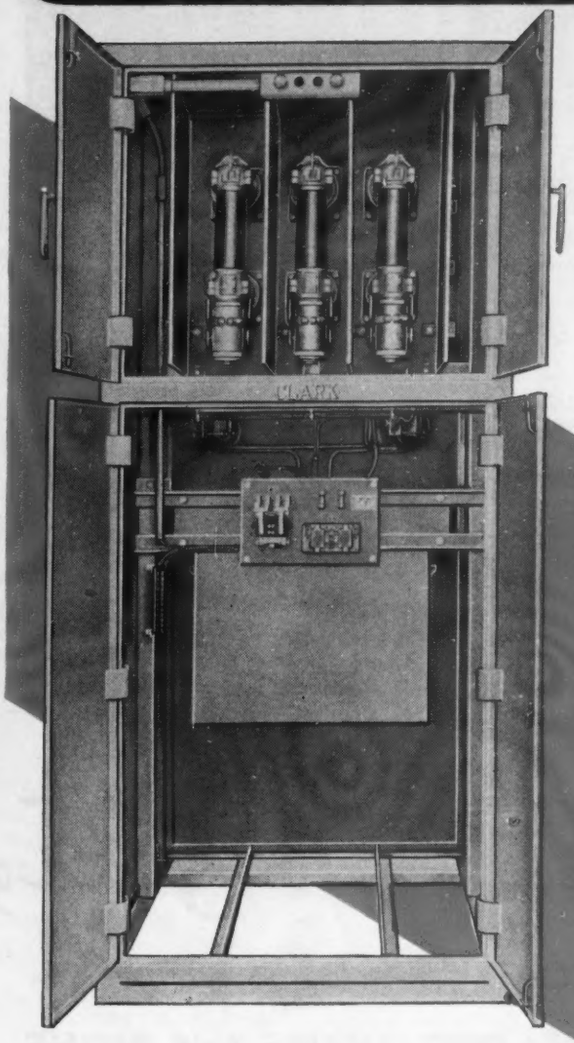
Compression braking is the Orton invention which made the Diesel crane *practical* for handling heavy loads. *Send for Orton Catalog No. 77 giving detailed description.*

NOW A DIESEL CRANE IS *SAFE*

ORTON CRANE & SHOVEL CO.

608 SOUTH DEARBORN STREET • CHICAGO 5, ILLINOIS • OFFICES IN PRINCIPAL CITIES

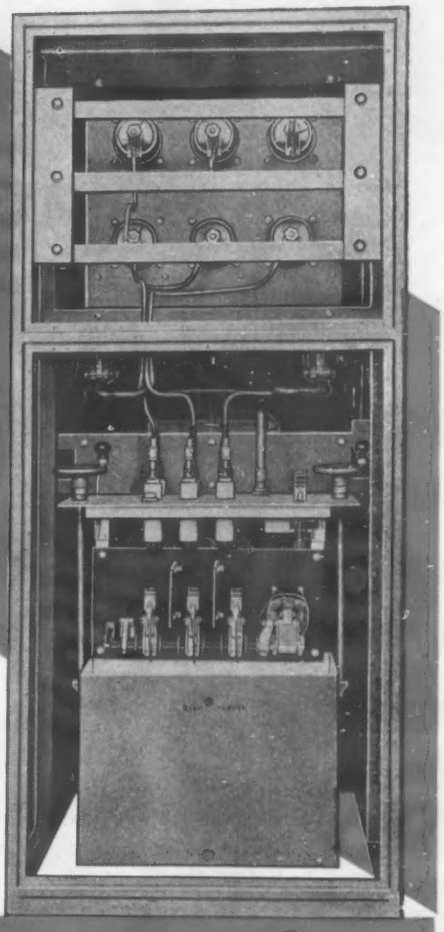
HIGH VOLTAGE MOTOR STARTERS
High Interrupting Capacity
UNIT STEEL CUBICLE CONSTRUCTION



"3C" Bulletin 6018 Type H I Motor Starter Front View —Open.

The "3C" Bulletin 6018 Type HI Motor Starter illustrated provides 150,000 K. V. A. Interrupting Capacity at 2300 Volts, 60 cycle.

These Starters are housed in steel cubicle units capable of installation singly, or in groups complete with integral bus work for multi-motor groups.



"3C" Bulletin 6018 Type H I Motor Starter Rear View, Tank Down.

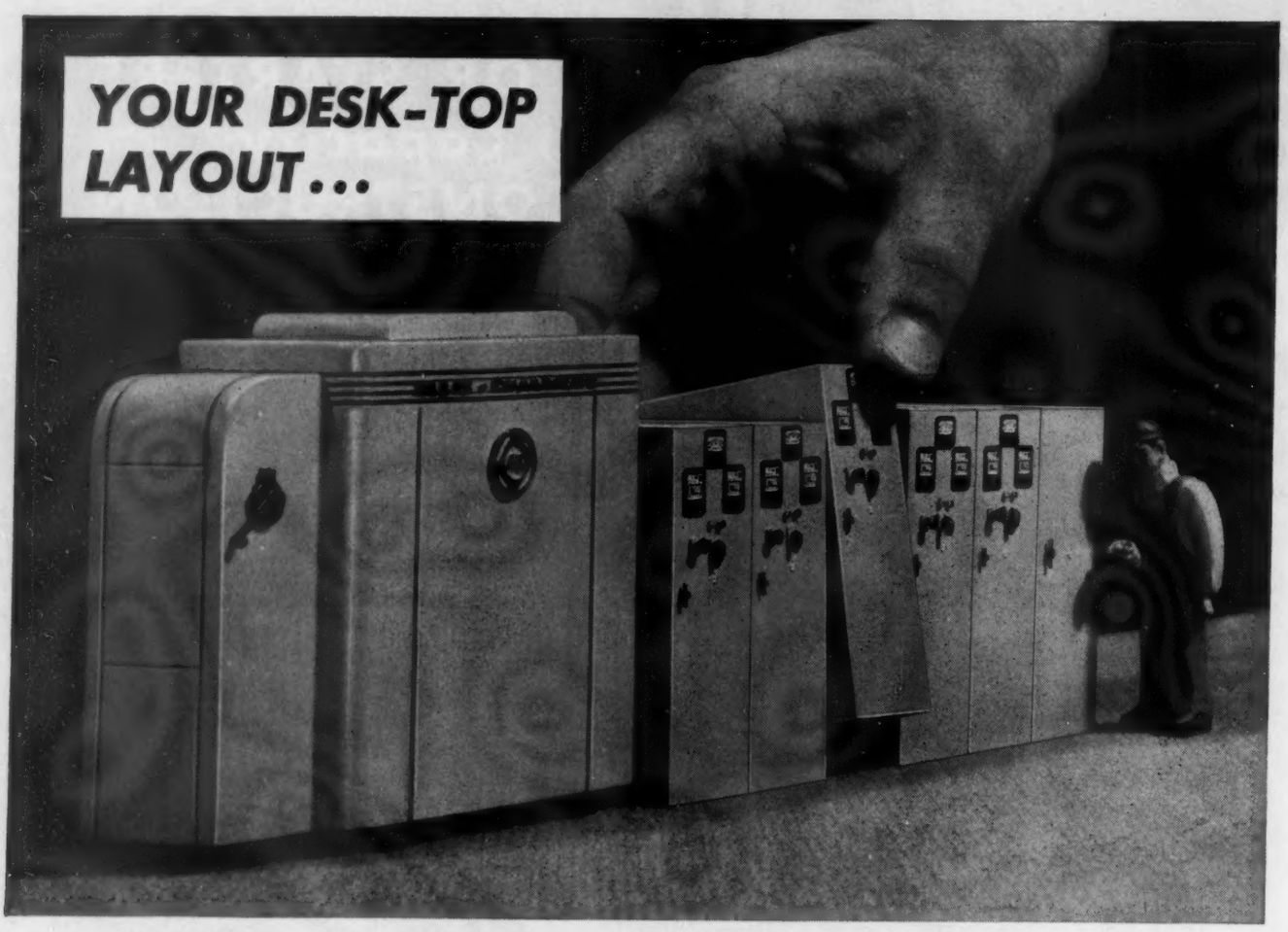
Equipment is available for furnishing these Starters for use with Squirrel Cage, Synchronous, and Wound-Rotor Motors.

Heavy-Duty Oil-immersed Contactors provide reliable service, and Magnetic Overload Relays give full, dependable Overload protection.

For complete information on "3C" High Voltage Motor Starters, contact our nearest District Office, or the Home Office in Cleveland.

THE CLARK CONTROLLER CO.

1146 EAST 152nd ST., CLEVELAND 10, OHIO • EVERYTHING UNDER CONTROL



Buy From Sight,

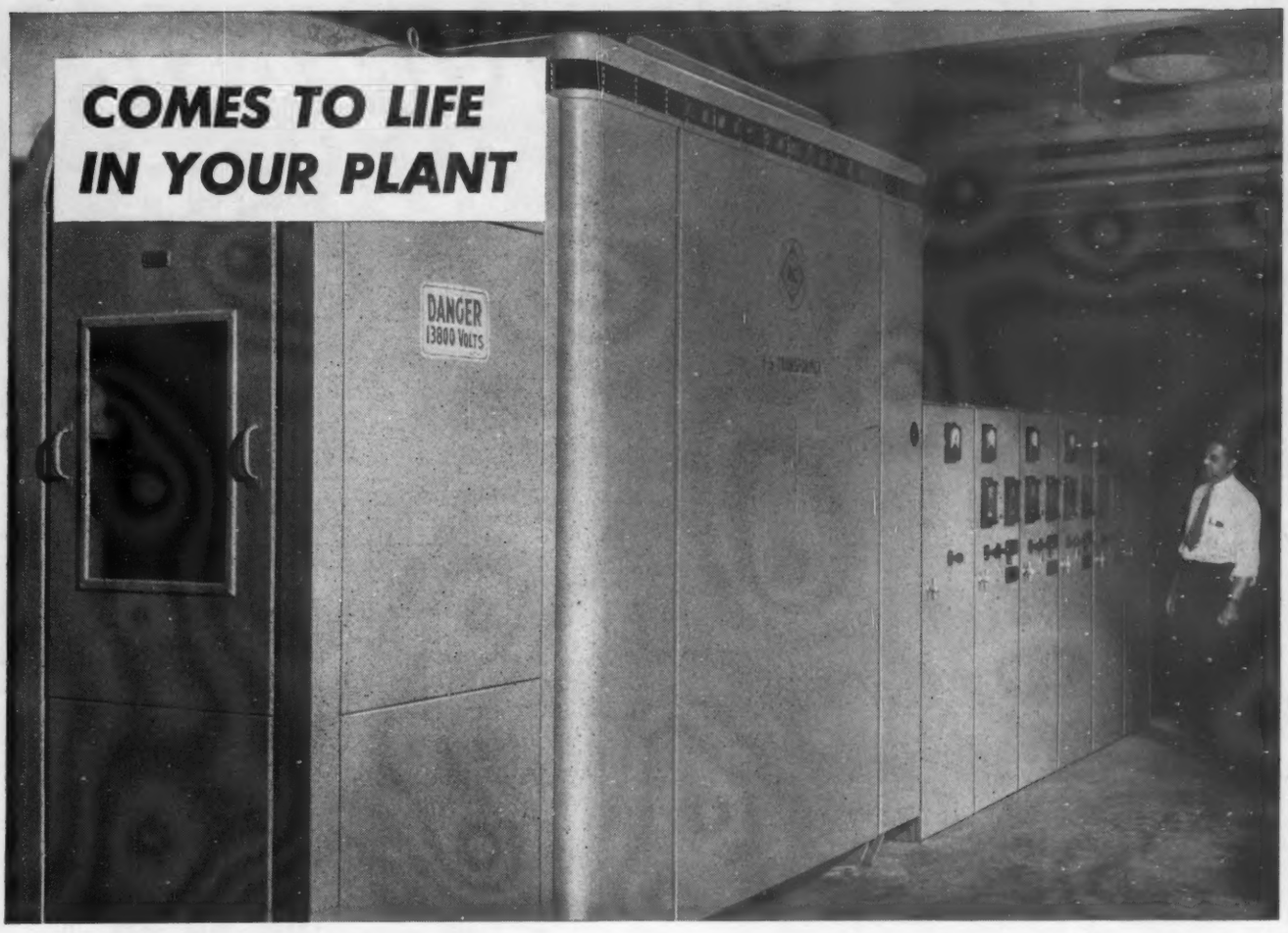
PROTECT YOURSELF AGAINST COSTLY ERRORS! ELIMINATE UNNECESSARY WASTE OF TIME! INSURE THE RIGHT UNIT SUBSTATION FOR YOUR PLANT — YOU DO ALL THREE WHEN YOU SOLVE YOUR POWER DISTRIBUTION PROBLEMS WITH THE HELP OF ALLIS-CHALMERS' "UNIT SUB BUILDER" SET!

YOU INSURE yourself against costly power distribution mistakes when you plan your unit substations *visually.* With the aid of Allis-Chalmers' "Unit Sub Builder" Set, you *pre-test* your ideas . . . see just what you're getting in terms of dimensions, characteristics, appearance.

In addition, visual planning is simple, practical, fast. *Right on the top of your desk* you can build up all possible solutions to your substation problems — compare them from every point of view.

For the last word in visualization, you can have a floor plan of your factory drawn to the same scale as the models — ½ inch to 1 foot; build up your unit sub *right where it will stand!*

All the elements making up Allis-Chalmers Prefabricated



and Buy Right!

Load Center Unit Substations are contained — in miniature — in the model kit. In addition, there's a "Unit Sub Slide Rule" to simplify breaker calculation and a valuable "Unit Sub Check List" to give you the added planning safety of a *double check.*

Models Prove Value

In the comparatively short period Allis-Chalmers' "Unit Sub Builder" Set has been available for assisting power distribution planners, engineers of many leading U. S. firms have taken advantage of its time-saving, trouble-saving benefits. They like the idea of working out solutions . . . without bogging down in complicated charts and catalogues.

This complete *and proven* service is yours with no obligation. To see for yourself how the models, check list, and slide rule can help you in the correct planning of your power distribution system, call your nearby Allis-Chalmers district office for a showing. ALLIS-CHALMERS MFG. CO., MILWAUKEE 1, WISCONSIN.

A 1953

—with

ALLIS-CHALMERS

Unit Sub Builder Set

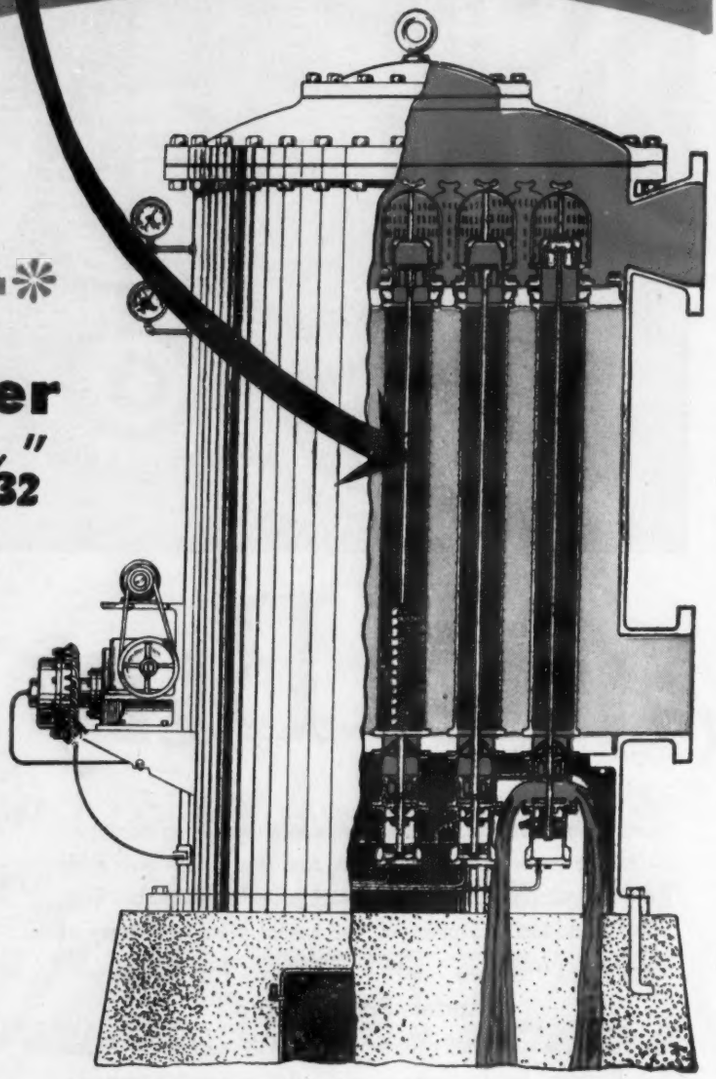
ADAMS AUTOMATIC WATER FILTERS

Remove GRIT and DIRT* from River Water

*15 times finer than 1/32"

Adams *Poro-Screen* Filters offer a practical answer to large-scale filtration ot dirty river water for use in hydraulic equipment. Designed for continuous, automatic operation and requiring a minimum of attention, Adams Automatic Filters supply the required volume of clean water for your operations—water free of dirt and grit which damage bearings, rolls, valves and other equipment. Highly successful on water cooling installations of open-hearth and heat-treating furnaces.

Adams Automatic Filters provide low velocity filtration. Their multiple tube design has no moving clearances, is fully automatic. One tube is back washed at a time while filter is delivering full rated capacity. Adjustable control gives flexibility of back-washing—excessively dirty water more frequently, normal water less frequently. Built in four sizes from 300 gpm. to 2000 gpm. Write for Bulletin 901.



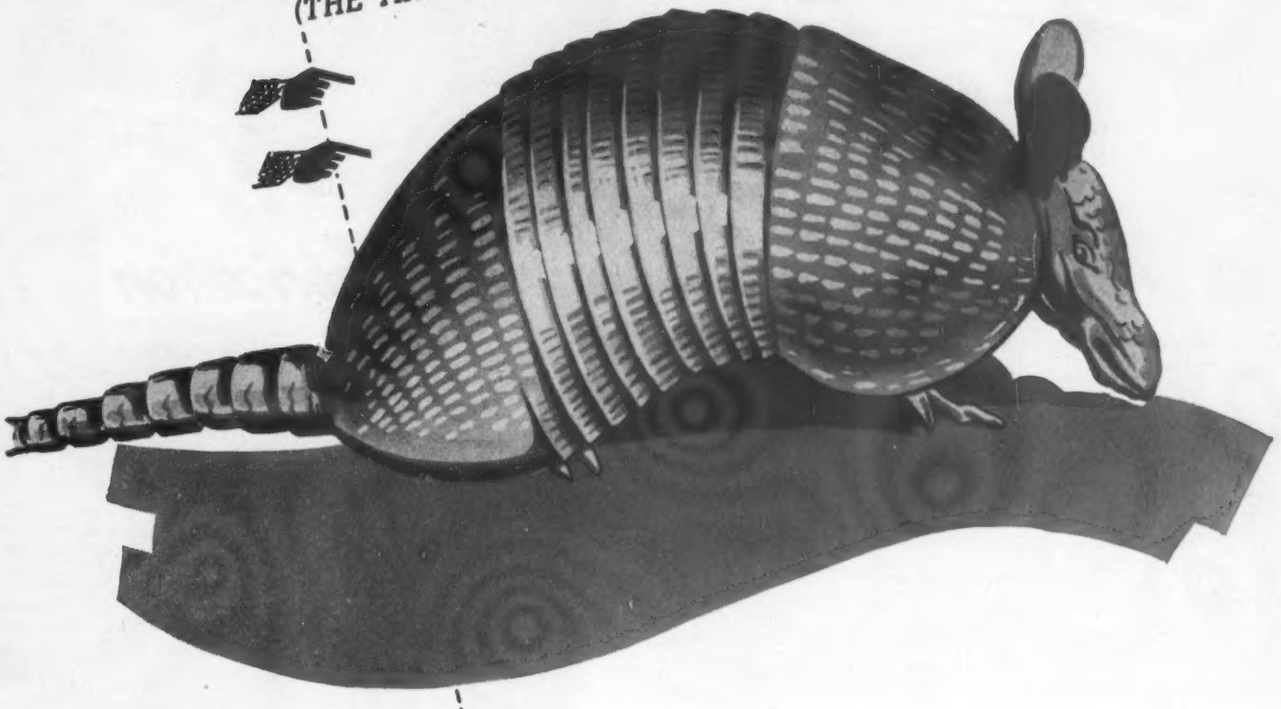
★ R. P. ADAMS COMPANY, INC. ★

75 CHICAGO STREET, BUFFALO, N. Y.

ADAMS PORO-STONE AND PORO SCREEN FILTERS

NATURE'S TANK

(THE ARMADILLO HAS NATURAL PROTECTION)



But INDUSTRY RELIES ON

JESSOP STAINLESS STEEL

For Protection Against:
OXIDATION · CORROSION · HEAT

The armadillo is well armed with a bony shell, consisting of numerous small plates, for protection against its natural enemies. To guard against the artificial enemies: *oxidation, corrosion,* and *heat,* hundreds of industries now depend upon JESSOP Stainless Steels. In many instances special analyses and special heat treating methods have been developed to meet unusually severe specifications. JESSOP Stainless Steels are available in all commercial forms including bars, strip, sheets, plates. Write for literature.

JESSOP STEEL COMPANY

Head Office and Works: WASHINGTON, PA.

REVERE COPPER AND BRASS INCORPORATED

uses GAS extensively

at the Halethorpe

Extrusion Plant, Baltimore

No. 1 Magnesium Melting Gas Furnace

in Magnesium and Aluminum fabrication

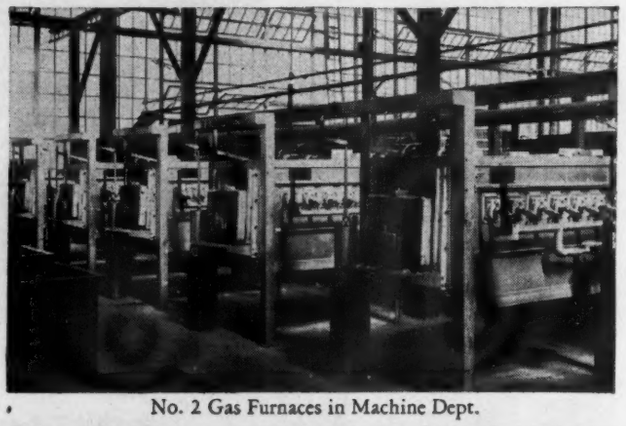
There are, for instance, six Gas furnaces for MAGNESIUM MELTING. These furnaces utilize the ultra-modern ceramic Gas burner, thirty to each furnace. The pot, which sits inside the furnace shell, holds a charge of about 4,000 pounds of magnesium. Temperatures range from 1350° to 1500° F. (Photo No. 1).

The well equipped MACHINE DEPARTMENT has six muffle type Gas furnaces and a Gas heated salt bath furnace. This equipment provides accurately controlled temperatures ranging from 1400° to 2400° F. for heat treating dies, mandrels and other production tools. (Photo No. 2).

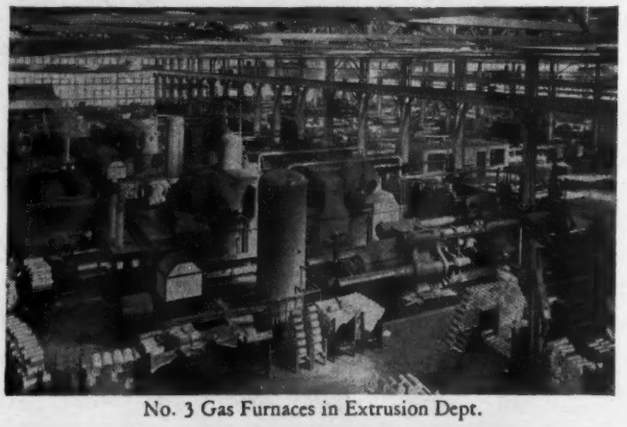
In the EXTRUSION DEPARTMENT, there are four large extrusion presses and between each pair of presses are large, Gas fired traveling furnaces through which billets pass to be preheated before extruding. (Photo No. 3).

ANNEALING of finished products, such as the tube shown here, as well as treatment of scrap (burning off oil and other waste prior to re-melting) are accomplished in a direct fired, recirculating, Gas unit, automatically controlled. (Photo No. 4).

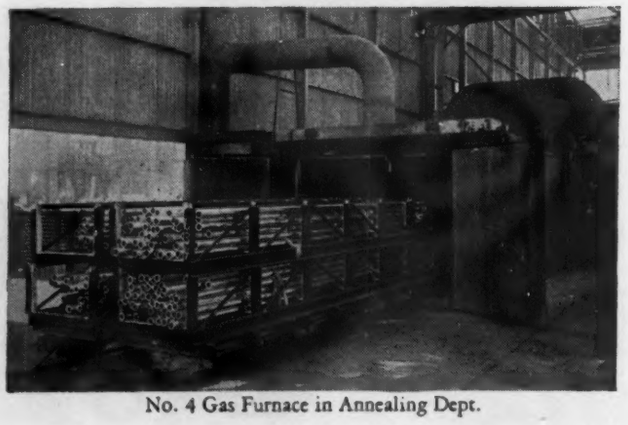
Gas, the most versatile fuel for all types of heat treating will do the speediest, most efficient, most economical job. Consult the Industrial Engineer of your local Gas Company on how Gas can help you.



No. 2 Gas Furnaces in Machine Dept.



No. 3 Gas Furnaces in Extrusion Dept.



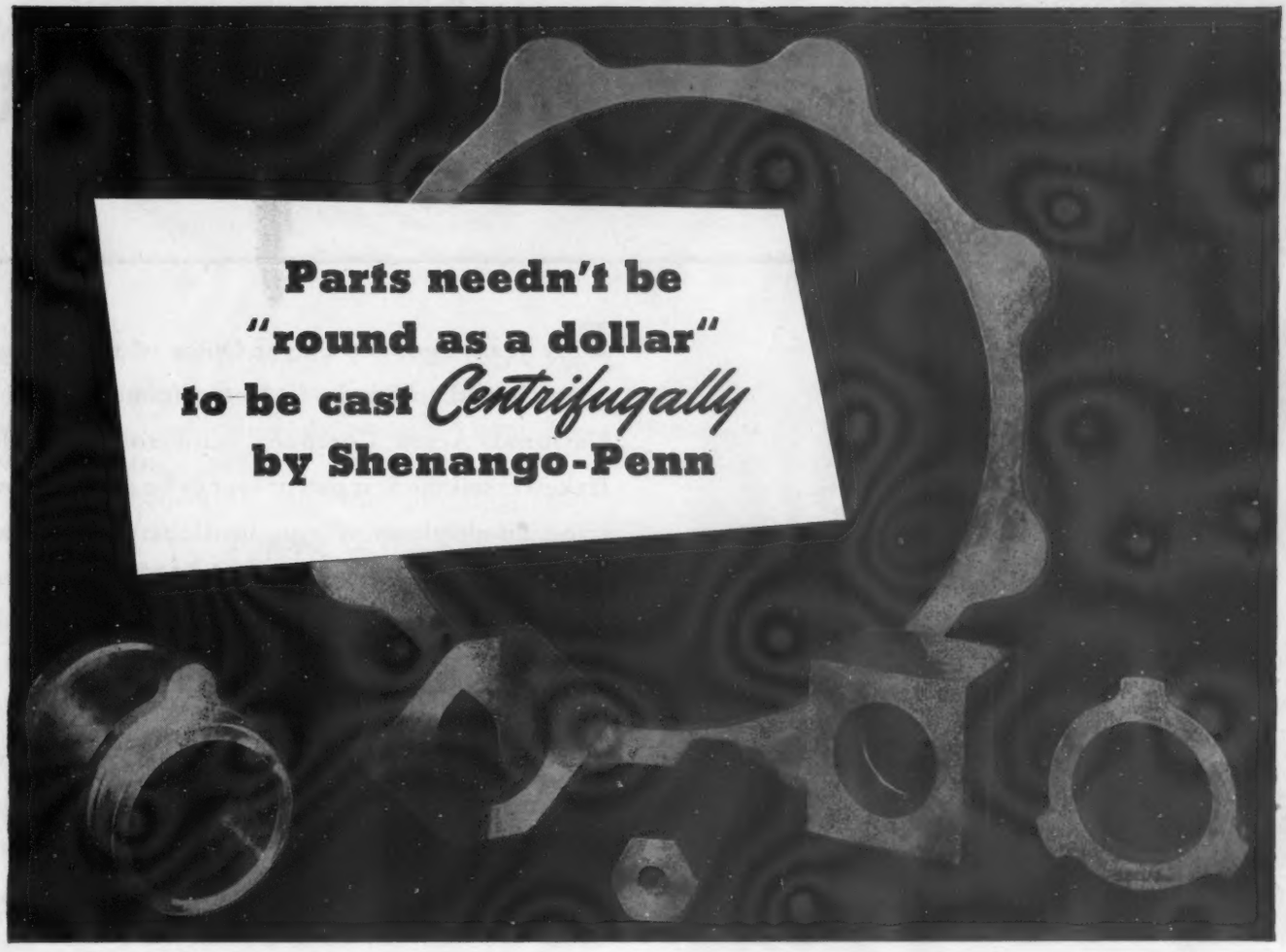
No. 4 Gas Furnace in Annealing Dept.

AMERICAN GAS ASSOCIATION

420 LEXINGTON AVENUE, NEW YORK 17, N. Y.

THE TREND IS TO GAS

FOR ALL INDUSTRIAL HEATING



At Shenango-Penn the centrifugal casting process isn't limited to plain rings, cylinders, or other parts of simple circular section. Advanced techniques permit us to cast almost any symmetrical shape centrifugally, thereby cinching a raft of advantages you just can't get by ordinary methods.

Metal for metal you gain greater strength, finer, denser, more uniform grain structure, freedom from porosity, blowholes and sand inclusions, better elongation, and superior resistance to wear and corrosion—qualities that have enabled Shenango-Penn to help many a machinery or equipment builder to make a good product still better, more durable . . . and usually at lower cost!

Check with Shenango-Penn on the parts you need. If you want them machined, rough-cut or finished to the nth degree of precision, we can take care of that too, in our modern, fully equipped shops.

FREE BULLETIN

Bulletin No. 143, yours for the asking, gives full information on Shenango-Penn centrifugally cast parts, including specifications, equivalents, and chemical and physical analyses of the many standard ferrous and non-ferrous alloys available. Write for this free data bulletin.

SHENANGO-PENN

SHENANGO-PENN MOLD COMPANY
461 WEST THIRD STREET • DOVER, OHIO
EXECUTIVE OFFICES: PITTSBURGH, PA.

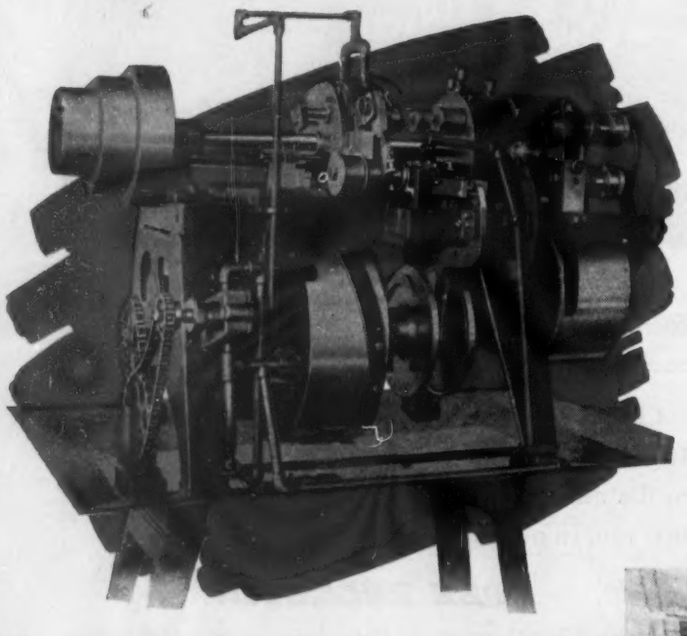
ALL BRONZES • MONEL METAL • ALLOY IRONS

"To all to whom

Fifty years ago, the Patent Office of the United States issued to Edwin C. Henn, founder of The National Acme Company, and to Reinhold Hakewessell the first patent ever to be granted covering a multiple-spindle automatic screw machine.

Perhaps it can be said that this was the real beginning of American mass production methods—the first multiple to produce, automatically, identical parts in large quantities.

From this start has grown our nation's ability to turn out vast numbers of automobiles, radios, refrigerators, typewriters, instruments and hundreds of other mechanical aids to working and living—at such low costs that they are within the buying reach of millions, both here and abroad.



This "4-Spindle Acme Automatic" is the first machine produced by National Acme—number one of a series of continuously improved models now totaling more than 40,000.

Here is the shop at Hartford, Conn. in which the first Automatic was produced, and the men who built that machine.

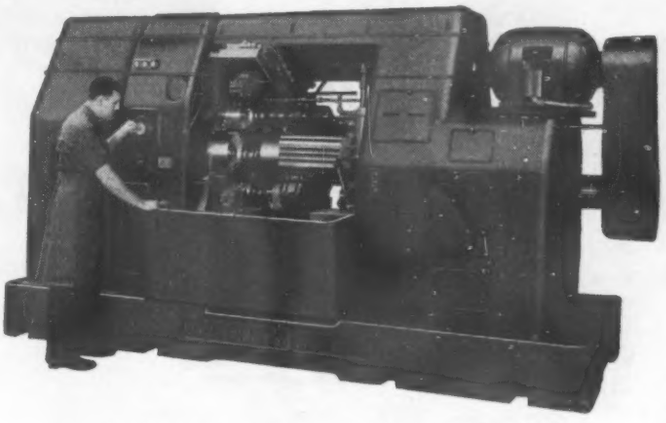
these presents shall come:"

National Acme enters its 51st year of serving industry with an extensive line of 1, 4, 6 and 8-Spindle Acme-Gridley Automatics—both Bar and Chucking types.

Every engineering refinement in these machines is geared to their original purpose—to *reduce the cost* of producing identical precision metal parts—from the smallest up to 12″ diameter.

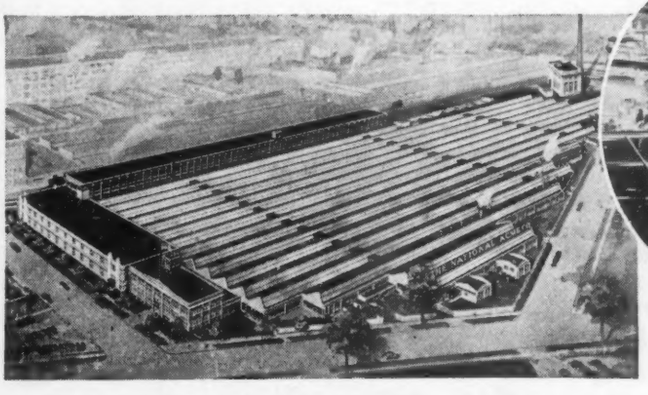
Many of America's largest manufacturing industries depend upon National Acme leadership in Automatics for their ability to create the mechanical marvels without which our wars could not be won, nor our modern standards of living achieved.

Our engineers will be glad to show you the advantages of these modern multiples in terms of guaranteed speeds, finish and lower production costs.



Modern Six Spindle Acme-Gridley Chucking Automatic—Capacity, 12″. Weight, 30 tons.

A typical production plant, equipped with Acme-Gridley Multiple-Spindle Automatic Machines.



The National Acme Plant at Cleveland—12½ acres of floor space—equipped and staffed for progressive engineering and precision manufacturing.

The NATIONAL ACME COMPANY

170 EAST 131st STREET • CLEVELAND 8, OHIO

ACME-GRIDLEY BAR AND CHUCKING AUTOMATICS: 1-4-6 AND 8 SPINDLE • HYDRAULIC THREAD ROLLING MACHINES AUTOMATIC THREADING DIES AND TAPS • THE CHRONOLOG LIMIT, MOTOR STARTER AND CONTROL STATION SWITCHES SOLENOIDS • CENTRIFUGES • CONTRACT MANUFACTURING

How to get

1. *THICK* COPPER DEPOSIT
2. *SMOOTH* SURFACE
3. *WITH SPEED!*

UNICHROME ALKALINE COPPER PLATING *combines all three!*

ONE user of Unichrome Copper gets a .001-inch deposit on a steel product of difficult shape—in 25 minutes! Another deposits a .0003-inch copper plate over assorted zinc die castings for the automotive industry—in 11 minutes—and the copper deposit is so smooth that it goes directly to the nickel tank without buffing! In these, and other similar cases, work comes from the tank in glistening perfection ...no pitting, nodules or burns visible.

Unichrome Copper has proved itself in plating all types of work—steel, zinc, aluminum—manually processed or fully automatic. It speeds up production two ways: high current density cuts plating time...smoothness of ductile deposits cuts buffing time. You'll find it buffs to high lustre with *light* pressure—also saving copper and buffing materials.

An outstanding development of the United Chromium Research Laboratories, Unichrome Copper is now being used by well-known concerns throughout industry . . . by automobile, aircraft, electrical equipment and appliance manufacturers, and others. We will gladly give you full details to show you why Unichrome Copper is being specified for installations of over 10,000-gallon-capacities. Write for leaflet UC.

Other Advantages of Unichrome Copper*

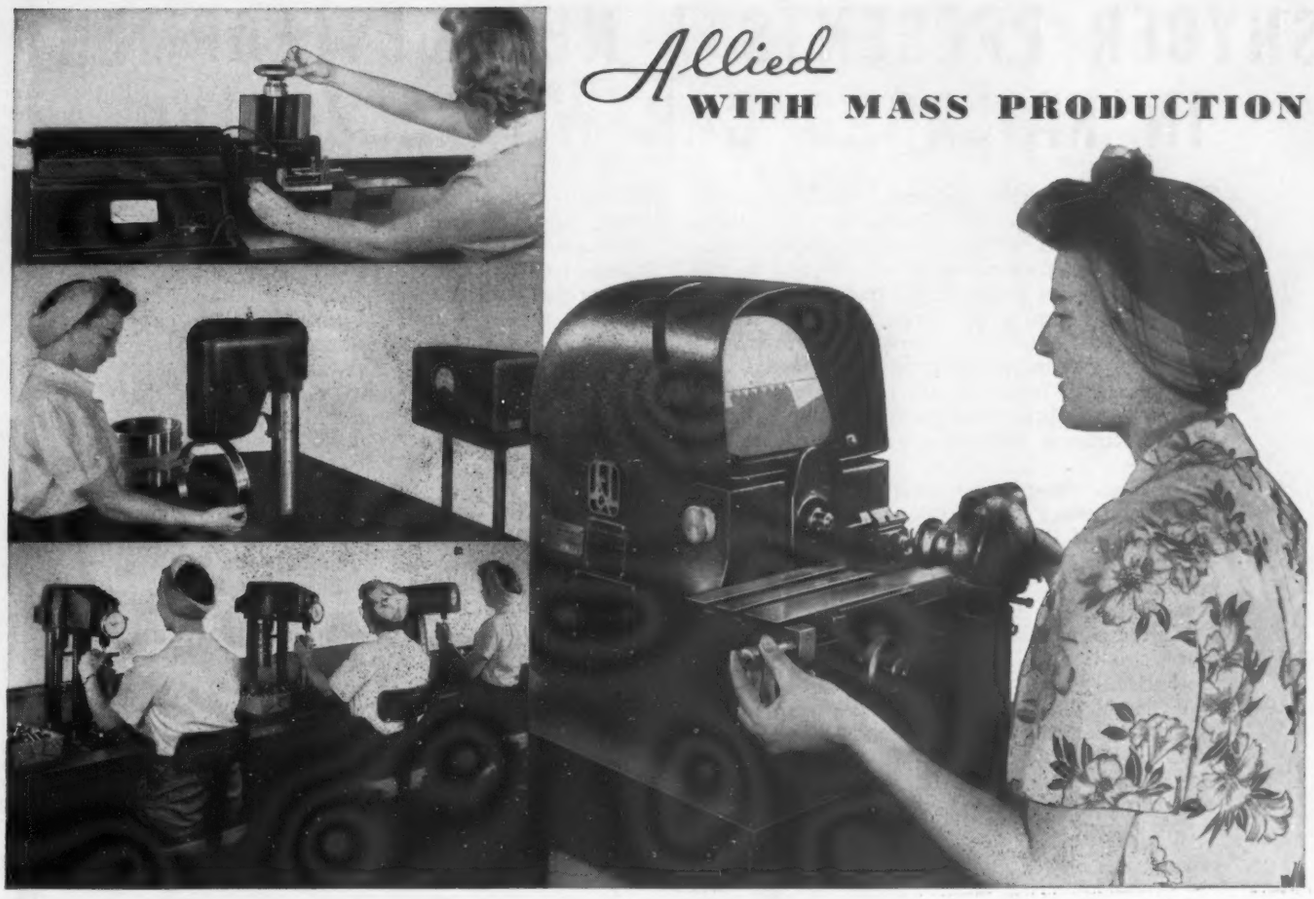
- Mildly alkaline, non-corrosive bath easier on racks and equipment
- Easily-controlled solution is non-gassing, contains no cyanide—presents no ventilation problems
- Moderate temperature operation—cuts down heating losses
- High anode current densities—fewer anodes
- Copper deposit is clean—requires no activation
- Excellent for zinc die castings
- Especially suited to aluminum plating processes

Unichrome Alkaline Copper

PROCESS OF **UNITED CHROMIUM**
INCORPORATED

51 East 42nd Street, New York 17, N. Y.
Detroit 7, Mich. • Waterbury 90, Conn. • Chicago 4, Ill. • Dayton 2, Ohio

OTHER U. C. PRODUCTS AND PROCESSES: Chromium Plating • Porous Chromium • *Unichrome Dips • *Unichrome Strip • *Anozinc Compounds *Unichrome Rack Coating • *Unichrome Stop-Off Lacquers and Compounds • *Unichrome Clear and Pigmented Lacquers • *Ucilon Protective Coatings
*Trade Mark Reg. U.S. Pat. Off.



Allied
WITH MASS PRODUCTION

HARDENED and PRECISION GROUND PARTS

THAT PASS *Any* INSPECTION

The facilities for turning out hardened and precision ground parts in highest volume production are to be found in one of the four large Allied plants. However, to you as a customer, this production capacity can be important only to the extent that quality standards are constantly maintained in every operation.

At Allied the finest inspection equipment is in use both in the production departments and for final inspection. Specifications for accuracy, hardness and surface finish are followed rigidly—your assurance that the parts you receive from Allied will be ready immediately for your assembly operations.

Inspection in our plant—*or yours*—always proves one point. If it's an Allied product—it's right!

ALLIED PRODUCTS CORPORATION

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PRECISION • EXPERIENCE • DEPENDABILITY
ALLIED CORPORATION PRODUCTS

SPECIAL COLD FORGED PARTS • STANDARD CAP SCREWS • HARDENED AND PRECISION GROUND PARTS • SHEET METAL DIES FROM THE LARGEST TO THE SMALLEST • JIGS • FIXTURES • STEAM-HEATED PLASTIC MOLDS • SPECIAL PRODUCTION TOOLS • R-B INTERCHANGEABLE PUNCHES AND DIES • DIE MAKERS' SUPPLIES

DETROIT PUBLIC LIBRARY

SNYDER PRESENTS A NEW DEVELOPMENT IN RAILROAD CAR WHEEL BORING

This special-purpose, automatic-cycle machine is designed and built by Snyder specifically for rough and finish boring wheels for railroad cars.

Its particular significance to railroads and to other industries employing comparable metal-cutting techniques on large, heavy castings, is that this machine combines improved accuracy with increased production rate and is engineered to maintain its efficiency over an estimated lifetime of 20 years. In these respects it constitutes a definite advance over existing practice.

On steel wheels, the cutting time for finish boring $\frac{1}{8}$" stock per side is 1 minute 20 seconds for a hole 7" long and 7" diameter. The same amount of stock is removed from cast iron wheels in 50 seconds. Cutting tools are T. C. tipped.

Chamfering and facing a $1\frac{1}{2}$ flange may be performed simultaneously with the boring operation.

A 19" stroke is provided so that rough and finish boring may be performed in succession. (On the set-up shown, rough and finish tools are mounted close together so that operations are, in part, simultaneous.)

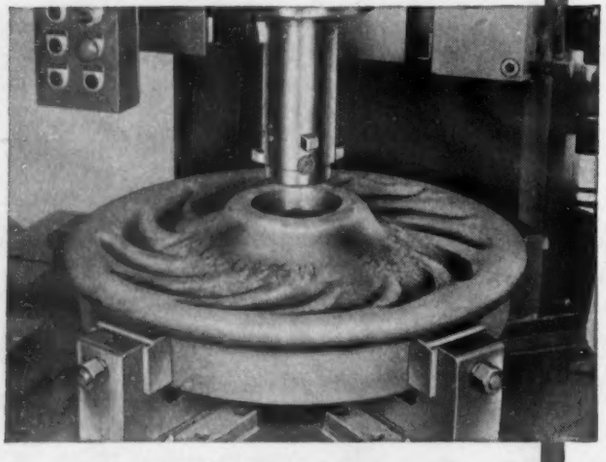
Spindle feeds are from 2" to 24" per minute and various spindle speeds are provided through the use of a four-speed selective transmission or a variable speed motor. Spindle is heavy-duty with taper roller bearing mounting.

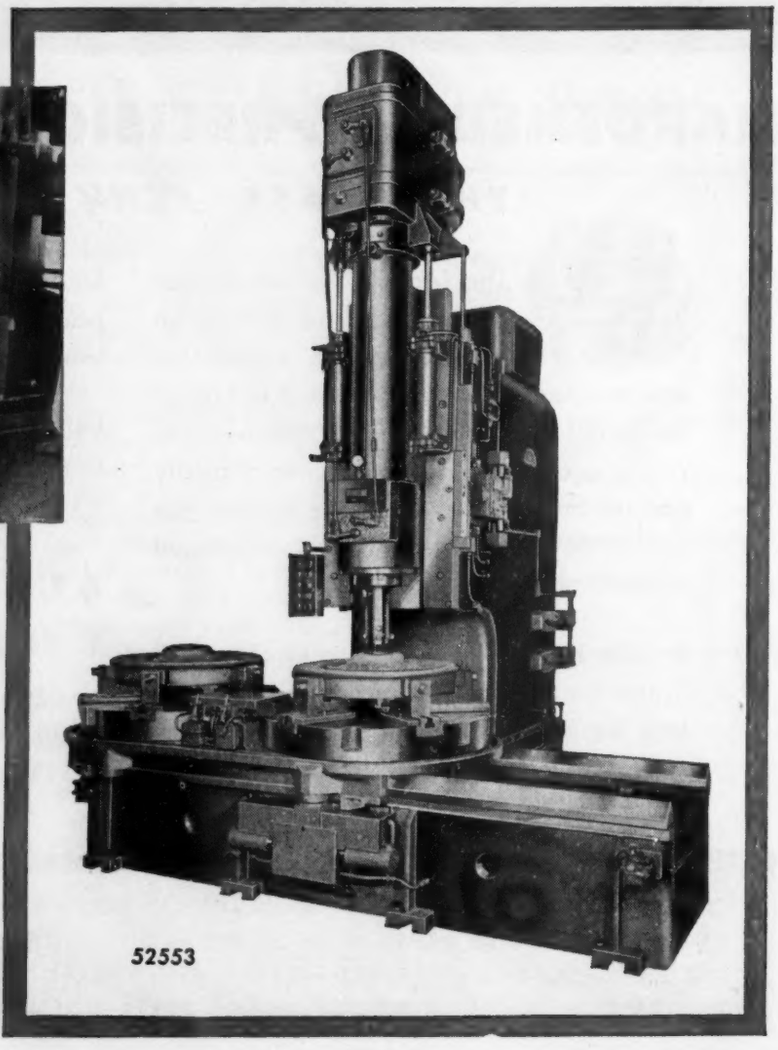
The table travels upon V-ways, case-hardened, ground and automatically lubricated to provide smooth operation. The V design allows for normal wear without side-play which would impair accuracy. Table travel is by hydraulic actuation with 5-second time interval.

Work is held by two 5-jawed chucks of 42" capacity, operated by individual hydraulic cylinders. Work-cycle is automatic. Capacity is 20 H.P. for a finishing machine and 30 H.P. for a roughing machine.

The advances represented in this machine—greater accuracy, higher production, longer life, automatic operation (practical for unskilled help), maximum safety—are typical of the advantages offered in Snyder-engineered special-purpose machines.

We invite your inquiries. Snyder Tool & Engineering Company, 3400 E. Lafayette, Detroit 7, Michigan.





52553

SNYDER

DESIGNERS AND BUILDERS OF MACHINERY FOR HIGH PRODUCTION AT LOW UNIT COST

21 Years of Successful Cooperation with Leading American Industries

Ability to withstand heavy impact load is an attribute of Bunting Cast Bronze Sleeve Bearings. The large area of contact with its oil film insulation serves to distribute and cushion the impact. The Bunting Brass & Bronze Company, Toledo 9, Ohio. Branches in Principal Cities.

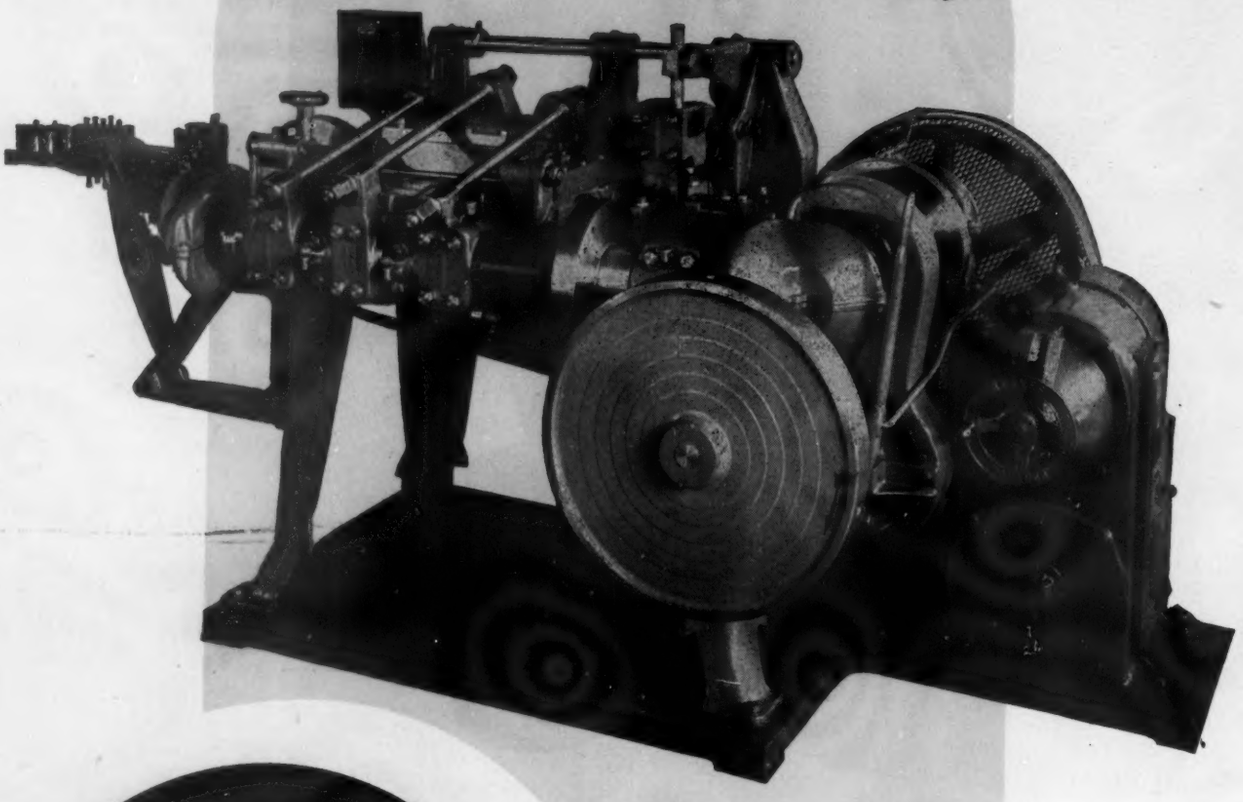
36

Bunting

BRONZE BEARINGS ☆ BUSHINGS ☆ PRECISION BRONZE BARS

NILSON

automatic metal wire forming machine



The Nilson line includes machines for forming paper clips, buckles, gate hooks, coat and hat hooks, ceiling hooks, wire ears, cable rings, screw eyes, sash chains, automobile slide chains, flat open link chains, staples, cotter pins, hose clamps, etc. Nilson also makes wire straighteners, wire reels, frame bending machines and special presses.

The machine pictured here is a simple and ingenious contrivance. Sturdy, solid, compact, requiring little space, it is a highly efficient and practical machine for forming wire and punching patterns from ribbon stock. Various patented features and extra attachments make it a necessary factor in reducing the manufacturing cost of your product. The Nilson automatic metal wire forming machine turns out the work faithfully, accurately and speedily—and it functions a long, long time free from repairs and replacements.

THE A. H. NILSON MACHINE COMPANY

BRIDGEPORT, CONN.

It's a big jump from skyscrapers to ocean liners—from oil storage tanks to barges. Yet frequently a new technique or an improved method discovered for one can be advantageously applied to the others.

For example, Ingalls, in 1926 discovered that an all-welded oil or chemical tank had decided advantages over riveted construction as it was absolutely leak-proof, lighter and stronger. This being the case, why, asked Ingalls' engineers, could not this same principle of all-welded construction be applied to shipbuilding? As a result, Ingalls pioneered the first large, 100%-welded ship, and thereby was instrumental in revolutionizing the entire shipbuilding industry.

Through research and alertness to new developments, Ingalls maintains its ability to produce fabricated structural steel and steel plate work better . . . faster . . . and at reasonable cost.

INGALLS
INDUSTRIES

THE INGALLS IRON WORKS COMPANY, THE INGALLS SHIPBUILDING CORPORATION. The Steel Construction Company, Birmingham Tank Company. Offices at BIRMINGHAM, New York, Washington, Pittsburgh, New Orleans. Shipyards at Pascagoula, Miss., and Decatur, Ala. Fabricating plants at Birmingham and Pittsburgh.

STRUCTURAL STEEL • STEEL PLATE WORK • ALL-WELDED TANKS • WAREHOUSE STEEL
CARGO & PASSENGER SHIPS • YACHTS • BARGES • WORKBOATS • DREDGES • SEAMULES

POWER *made possible* by ALLOY STEEL

The mighty crawler tractors that carve airports and highways out of wastelands are actually mobile power plants. And these power units are made possible by alloy steel! Only alloy steels have the qualities of strength and resistance to wear necessary for the rugged existence of a crawler tractor and alloy steels permit the elimination of excess bulk and weight.

Many vital parts of these powerful monsters are built of Wisconsin Alloy Steels. These alloy steels have proven their quality in thousands of applications. Better control, fewer rejections, finer steel, are more than slogans to Wisconsin Steelmen. They are the very foundation of Wisconsin steelmaking tradition.

Contact Wisconsin's sales and metallurgical staffs for the facts you need about alloy steel applications. You'll get the benefit of top-flight steelmaking "know-how," because the name "Wisconsin" means excellence in alloy steel.

WISCONSIN STEEL COMPANY

(Affiliate of International Harvester Co.)

180 North Michigan Avenue Chicago 1, Illinois

STEEL OF SUPERB QUALITY

WISCONSIN ALLOY STEELS

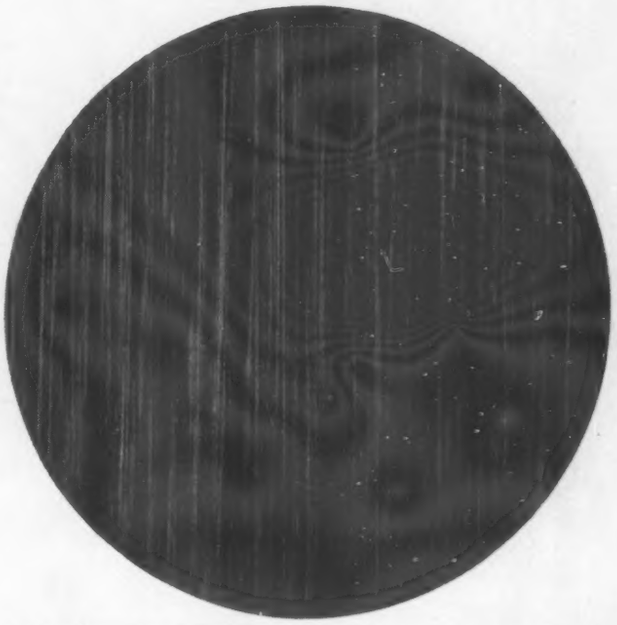
What's all this about SUPERFINISH?

• If you've thought of *Superfinish* as a lavishment, then perhaps it's time to look into it a little further. You'll find enough evidence to change your notions—and perhaps give you a new competitive advantage in the form of lower costs.

No matter how fine a ground surface may appear to the eye, it has defects . . . scratches and ridges produced by the point of the turning tool . . . larger defects such as grinder feed spirals and chatter marks . . . partially loosened splinters of metal ready to come off on contact with another surface . . . soft surface metal, annealed by the heat of the grinding wheel. In practically every case, fragmented metal will be torn from the mating surfaces to mix with lubricants, causing abrasive wear and creating a larger amount of clearance.

Superfinishing prevents this by removing both grit scratches and longer pitch defects due to minute machine tool inaccuracies. It provides the surface smoothness to maintain a uniform oil film—to reduce wear—to eliminate bearing trouble and lengthen bearing life.

Superfinishing is a quick and inexpensive process. And in many cases it can reduce present manufacturing costs by eliminating other more costly processes. This is a good time to get complete information about *Superfinishing*. Write us.



This photomicrograph (25 x magnification) shows a ground surface with the familiar scratches and ridges caused by single direction stock removal. Surface roughness is 35 micro-inches (Profilometer reading).

The same piece, 30% Superfinished to 15 micro-inches. Note how ridges have been reduced. A completely Superfinished surface of 2 to 3 micro-inches will leave no defects to penetrate the oil film or abrade the mating surfaces.

GISHOLT MACHINE COMPANY

1217 East Washington Avenue • Madison 3, Wisconsin

GISHOLT

Look ahead

keep ahead

with Gisholt

TURRET LATHES • AUTOMATIC LATHES • SUPERFINISHERS • BALANCERS • SPECIAL MACHINES

Iridite Offers a Fast, Sure Way to Lick Corrosion in Zinc, Cadmium, Galvanizing!

By the stop-watch . . . by the salt-spray . . . from every angle . . . Iridite gives you an anti-corrosion agent that will boost sales appeal and profits in your zinc, cadmium and galvanized products.

EASY TO USE!

It's as simple as this to use: Immerse your parts manually or automatically—in single racks or in bulk —*for only 15 to 60 seconds*—in an Iridite solution. No special equipment needed. No slowing up of fast-moving, automatic production lines. Normal shop temperatures suffice. And the Iridited parts dry in a few seconds for immediate handling, packing and shipping.

MANY APPLICATIONS!

Use Iridite as a final protective finish . . . as a paint base for permanent adhesion . . . as a cost-cutter in combination with galvanizing or zinc plate to replace more expensive materials. No matter how you use it, Iridite *unites chemically* with the zinc or cadmium . . . won't flake, chip or peel when the part is bent . . . won't alter dimensions on the closest tolerance part.

TEST IT YOURSELF!

Iridite is currently available in colorful, eye-appealing red, blue, green, bronze, olive drab, black and transparent Iridite-Bright. Send for a free test panel . . . half coated with Iridite, half unprotected. Check it in your laboratory. See for yourself how Iridite puts the "finishing touch" on your products . . . the "profitable touch" on your sales! Rheem Research Products, Inc., 1403 Standard Oil Building, St. Paul and Franklin Streets, Baltimore 2, Maryland.

BRANCHES—570 Lexington Ave., New York 22; 20 E. Jackson Blvd., Chicago 4; 2411 Sichel St., Los Angeles 31. Distribution in: Waterbury; Grand Rapids; Detroit; Los Angeles; Long Island City.

RHEEM RESEARCH PRODUCTS, INC.

IRIDITE

Standard Oil Bldg., Baltimore 2, Md.

Reg. U. S. Pat. Off.

BUILT BY MORGAN *Engineering*

ONE OF TWO MORGAN 200-TON, 63′0″ SPAN UNIVERSAL TYPE INGOT STRIPPERS IN A MID-WESTERN ELECTRIC FURNACE STEEL PLANT

The Stripper as illustrated will perform three distinct stripping operations without change in the stripping unit.

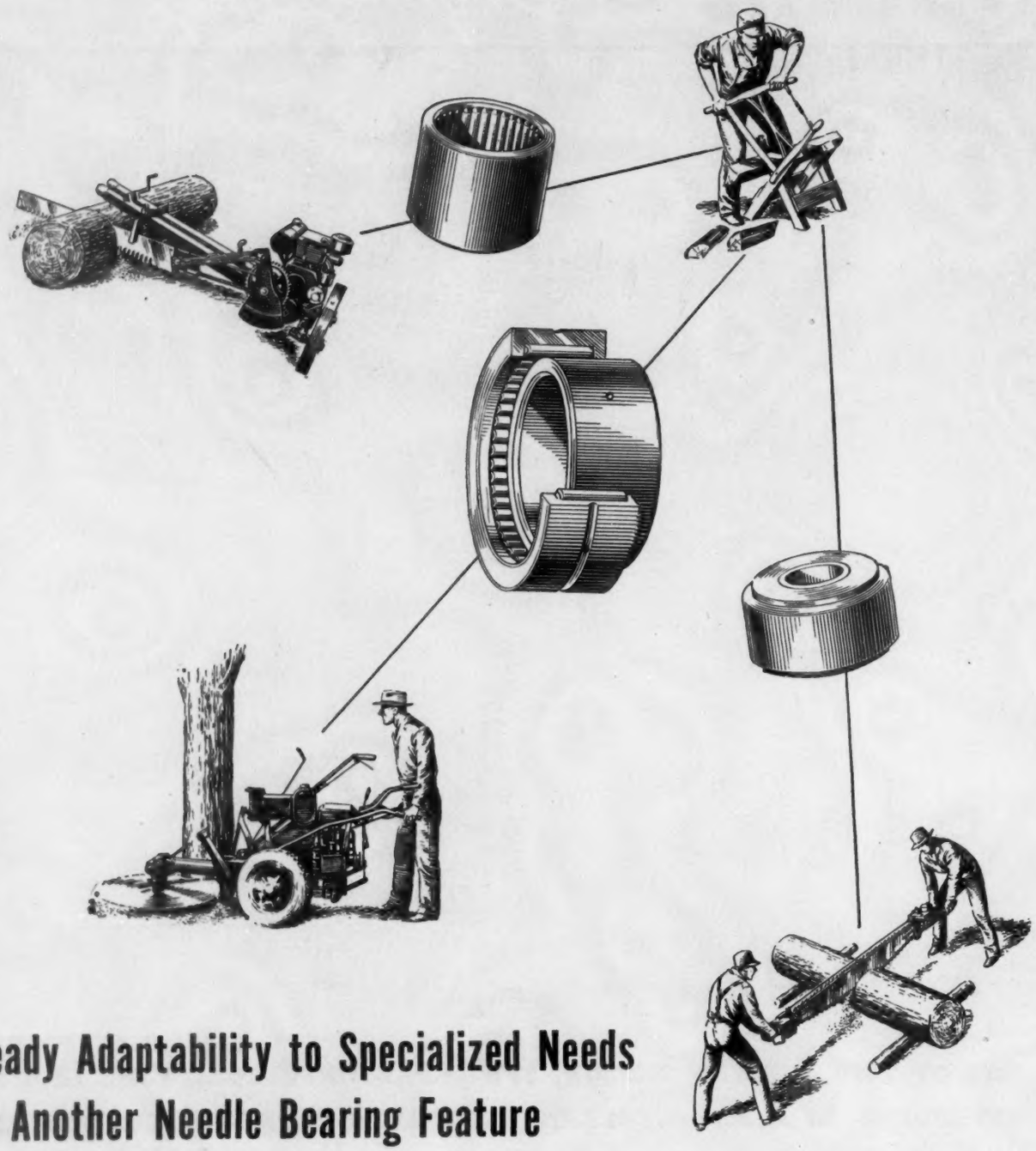
(1) Strip small-end-up or standard ingots.
(2) Strip big-end-up hot top ingots.
(3) Break small-end-up ingots loose from stools.

With this type of Stripper it is possible to strip a mixed heat without lost time.

Additional Morgan equipment in this plant includes: Two 300-Ton, 65′0″ Span Pouring Cranes. Three 150-Ton, 65′0″ Span Pouring Cranes. Two 150-Ton, 80′3″ Span Hot Metal Charging Cranes.

THE MORGAN ENGINEERING CO.
ALLIANCE, OHIO. 1420 Oliver Building, Pittsburgh

DESIGNERS • MANUFACTURERS • CONTRACTORS • BLOOMING MILLS • PLATE MILLS • STRUCTURAL MILLS • ELECTRIC TRAVELING CRANES • CHARGING MACHINES • INGOT STRIPPING MACHINES • SOAKING PIT CRANES • ELECTRIC WELDED FABRICATION • LADLE CRANES • STEAM HAMMERS • STEAM HYDRAULIC FORGING PRESSES • SPECIAL MACHINERY FOR STEEL MILLS



Ready Adaptability to Specialized Needs is Another Needle Bearing Feature

Major design changes are seldom necessary to gain all the advantages of anti-friction Needle Bearings. The Needle Bearing principle of a full-complement of small diameter needle rollers which gives increased load capacity and longer service life is widely applicable. And the Torrington line includes a type and size that is engineered to meet virtually every requirement of modern space-plus-weight-saving designs.

Thousands of outstandingly successful applications have been made where only slight modifications of existing designs and shop practice have enabled manufacturers to improve product efficiency —and often with resulting cost savings.

Let us give you more details on some of these applications in your own field. Full technical data and many applications are given in the Torrington Needle Bearing Catalog No. 32, available upon request. And our engineering staff will be glad to give every assistance in the layout of specific Needle Bearing applications designed to meet *your* requirements.

THE TORRINGTON COMPANY
TORRINGTON, CONN. SOUTH BEND 21, IND.
Offices in All Principal Cities

TORRINGTON NEEDLE BEARINGS

PRODUCTION FLOURISHES
ON GOOD CUTTERS

MODERN DESIGNS
SELECTED STEELS
SCIENTIFIC HEAT TREATMENT

BROWN & SHARPE CUTTERS – give outstanding performance – keep production high – costs low.

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BROWN & SHARPE MFG. CO. · · Providence 1, R. I., U. S. A.

. . . . We urge buying through the Distributor

BROWN & SHARPE CUTTERS

Specializing on

IMPOSSIBLE TESTING JOBS

Here's a revolutionary testing device that may help with that job you have considered impossible.

It has reported the stresses in the tips of aircraft wings during 500 mph power dives.

It has measured the expansion "wave" in anti-aircraft gun barrels as the shell flashes from breech to muzzle.

It is continuously reporting the strains deep in the masonry heart of mammoth dams.

It has checked the trigger-loading in ship launchings, revealed secrets about residual stresses in welded ship plates, and given accurate information about how ship structures react to the buffeting of giant waves.

It accurately weighs crane loads and permits readings to be taken at distant points.

It spots overstressed members in bridges and structures, and indicates where reinforcing is needed.

It can transmit information on fluid levels in isolated tanks, to points a hundred miles or more away.

This list merely suggests the many current applications of the SR-4 strain gage, which one engineer called "the most important engineering development in years," and does not begin to define its possibilities. It can help you in a dozen ways, in checking theoretical against actual performance, in determining both static and dynamic stresses, and in assisting in product and production improvement. Ask for Bulletin No. 179.

The Baldwin Locomotive Works, Baldwin Southwark Division, Philadelphia 42, Pa., U.S.A. Offices: Philadelphia, New York, Chicago, St. Louis, Washington, Boston, San Francisco, Cleveland, Detroit, Pittsburgh, Houston, Birmingham, Norfolk.

BLW THE BALDWIN GROUP

BALDWIN

SOUTHWARK

TESTING EQUIPMENT

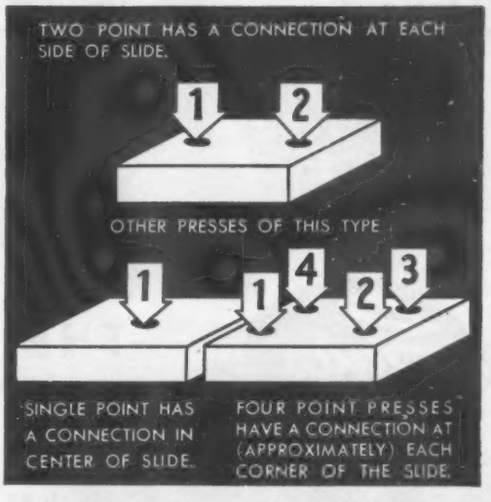
Modern Presses

For MAXIMUM PRODUCTION

Manufacturers of sheet metal products interested in "stepping-up" production to reduce manufacturing costs and to meet the pent up demand for their products, will find it advantageous, as many leading manufacturers have, to consider the installation of Modern Cleveland Presses which are designed for speed, accuracy, and economy of operation.

Furnished in three types, in sizes and capacities to suit requirements, they can be equipped with either air or hydraulically operated friction clutch and brake, electrically controlled, a feature which reduces physical fatigue and provides for safe operation of the Press at all times.

The Cleveland Two Point illustrated above is rated at 350 tons capacity, has 24" stroke, 12" adjustment, 56" Shut Height, 60" x 136" bed area and operates at 14 strokes per minute.


TWO POINT HAS A CONNECTION AT EACH SIDE OF SLIDE.
1
2
OTHER PRESSES OF THIS TYPE
1
1
4
2
3
SINGLE POINT HAS A CONNECTION IN CENTER OF SLIDE.
FOUR POINT PRESSES HAVE A CONNECTION AT (APPROXIMATELY) EACH CORNER OF THE SLIDE.

CLEVELAND PUNCH and SHEAR WORKS COMPANY

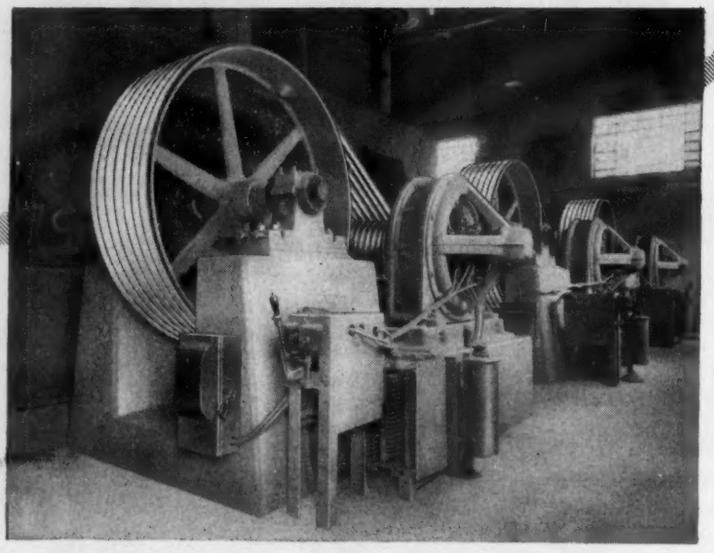
EAST 40th and ST. CLAIR AVENUE • CLEVELAND 14, OHIO

District Offices NEW YORK • CHICAGO • DETROIT • PHILADELPHIA • PITTSBURGH

Here is **WHY**

Your STANDARD Gates Vulco Ropes Are Today Giving BETTER SERVICE Than ANY V-Belts Ever Built Before!

EARLY IN THE WAR, it became perfectly clear that Army tanks, tractors and self-propelled big guns in *combat service* simply *had* to have V-Belts of greater strength and durability than had ever been built before. Gates developed these greatly superior V-Belts through intensified, specialized research — and here is why this fact is now important to YOU: —



✓ **Every Improvement developed by Gates for these Army V-Belts has also been added, day by day, to the quality of the Standard Gates Vulco Ropes which have been delivered to you.**

This is one of the very few instances in which improvements developed primarily for military use could be passed on immediately to you. Ordinarily, *you* would have had to wait. An exception was made in the case of Gates V-Belts because it was recognized that industry needed the best possible V-Belts in order to achieve the greatest possible production —and maximum production was vitally essential.

That is why Gates has been able to pass on to you, day by day, every V-Belt improvement developed for our armed forces during the war—and that is why your *Standard* Gates Vulco Ropes are today delivering far better service than *any* V-Belts ever built before!

All Gates V-Belts are Built with
The Patented
CONCAVE SIDE

Gates
THE MARK OF SPECIALIZED RESEARCH

THE GATES RUBBER COMPANY

Engineering Offices and Jobber Stocks in All Large Industrial Centers

483

GATES VULCO ROPE DRIVES

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LOS ANGELES 21, CAL., 2240 E. Washington Blvd. DENVER 17, COLO., 999 S. Broadway. DETROIT 2, MICH. 223 Boulevard Bldg.
PORTLAND 9, ORE., 333 N.W. 5th Ave. DALLAS 2, TEXAS, 1710 N. Market St. SAN FRANCISCO 3, CAL., 170 Ninth St.

How Up-To-Date are you on ALUMINUM?

Flies and streamers, courtesy Abercrombie & Fitch Company, New York.

WHICH FLY FOR THE CAST?

PARMACHENE BELLE, Royal Coachman, Grey Hackle, Silver Doctor . . . the skilled angler goes over all his flies, attempts to match fish and conditions before casting.

Nowadays the expert designer does much the same; with scientific care, he goes over the entire field of materials, rechecks the list of aluminum alloys, chooses a specific alloy, in a specific temper and form—*matches the alloy to the job and special requirements.*

For example, a manufacturer of roofing for use in smoke-laden atmospheres, may want strength with lightness . . . plus high corrosion-resistance.

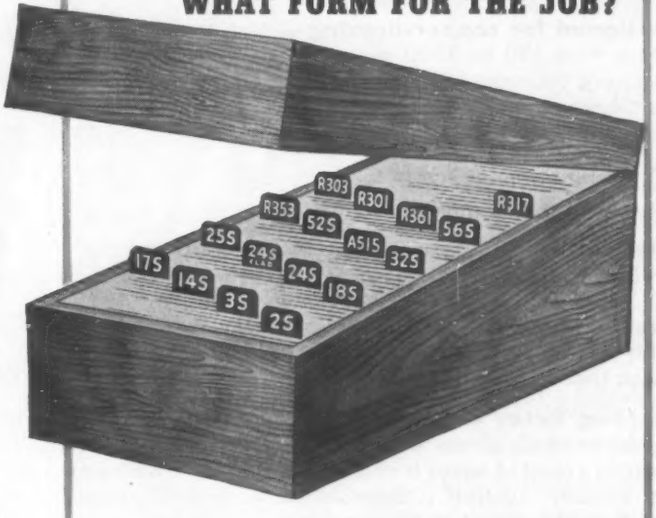
Another manufacturer, his product for indoor use, may require a high strength-to-weight ratio; he has no interest in corrosion-resistance.

In every case, there is a *right* Reynolds Aluminum alloy to use, available in various tempers and forms. Its selection is highly important, for it means a better, more serviceable product at lower cost.

Consider Aluminum . . . Consult Reynolds

Whatever your interest, Reynolds technicians are ready to co-operate with your engineers. Offices in principal cities. Phone nearest office or write Reynolds Metals Co., Aluminum Div., 2520 So. Third St., Louisville 1, Ky.

WHAT ALLOY? WHAT TEMPER? WHAT FORM FOR THE JOB?



Match the alloy to the job, obtaining also the temper needed in the form best adapted to your production.

REYNOLDS METALS

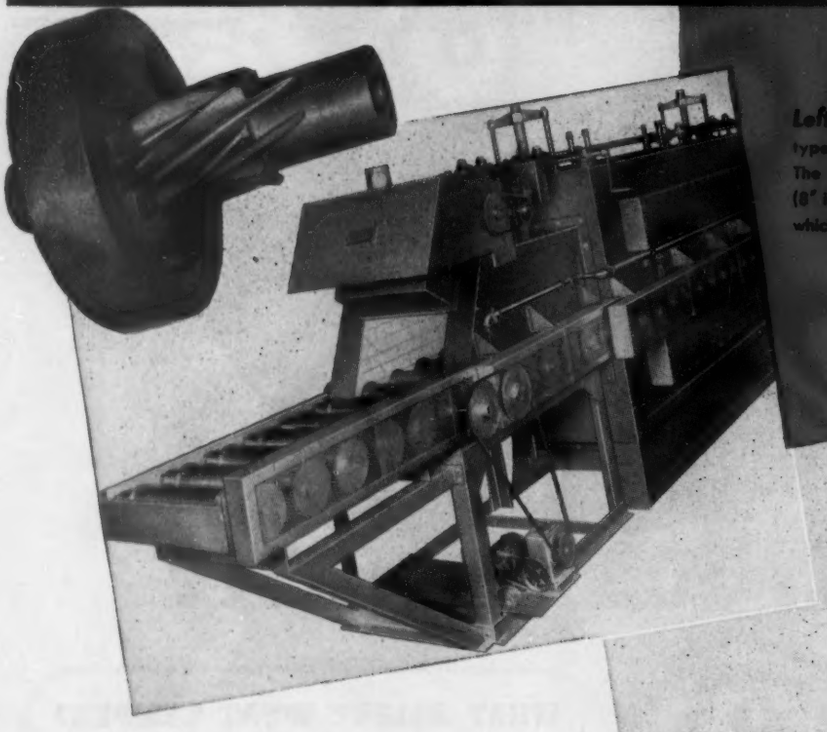
9272-A1-38

REYNOLDS ALUMINUM

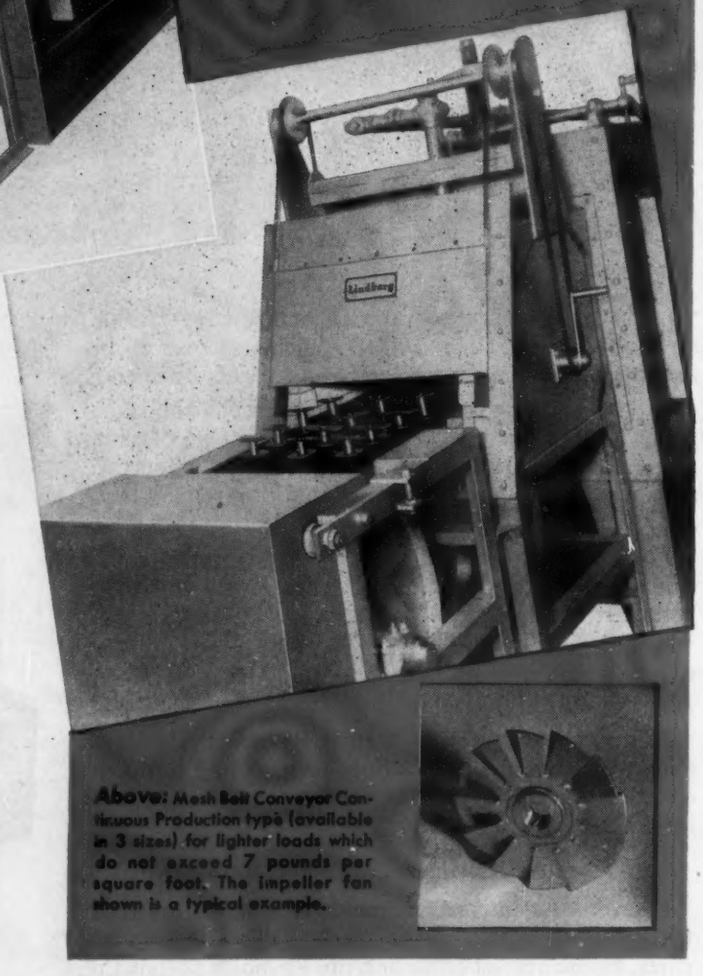
The Great New Source of

INGOT • SHEET • SHAPES • WIRE • ROD • BAR • TUBING • PARTS • FORGINGS • CASTINGS • FOIL • POWDER

There's A Versatile LINDBERG Furnace to Production Braze *Continuously* Any Assembly



Left: Roller Hearth Continuous Production type (available in 3 sizes) for heavy loads. The fourteen-pound spiral gear assembly (8" in dia., 2" thick) shown, is typical of work which this furnace will efficiently handle.



Above: Mesh Belt Conveyor Continuous Production type (available in 3 sizes) for lighter loads which do not exceed 7 pounds per square foot. The impeller fan shown is a typical example.

Designed for copper-brazing at high temperature, loads from 130 to 2300 gross pounds an hour—these Lindberg Furnaces efficiently meet the needs of every continuous production job, including:

- **Low temperature silver brazing**
- **Bright annealing**
- **Sintering of powder metals**

No Production Delays—Elements are easily replaced without cooling the furnace down. With a top capacity of 2500° F., the AT-type Globar heating elements operate at the 2050° F. copper brazing level at considerably less than critical temperatures. This effectively prolongs their life.

Cooling Rates are Automatically Controlled to meet the needs of the work being treated. Proper temperature level of water in cooling chamber is maintained. An Aquastat controls a Solenoid Valve which regulates the flow of water in the jacket.

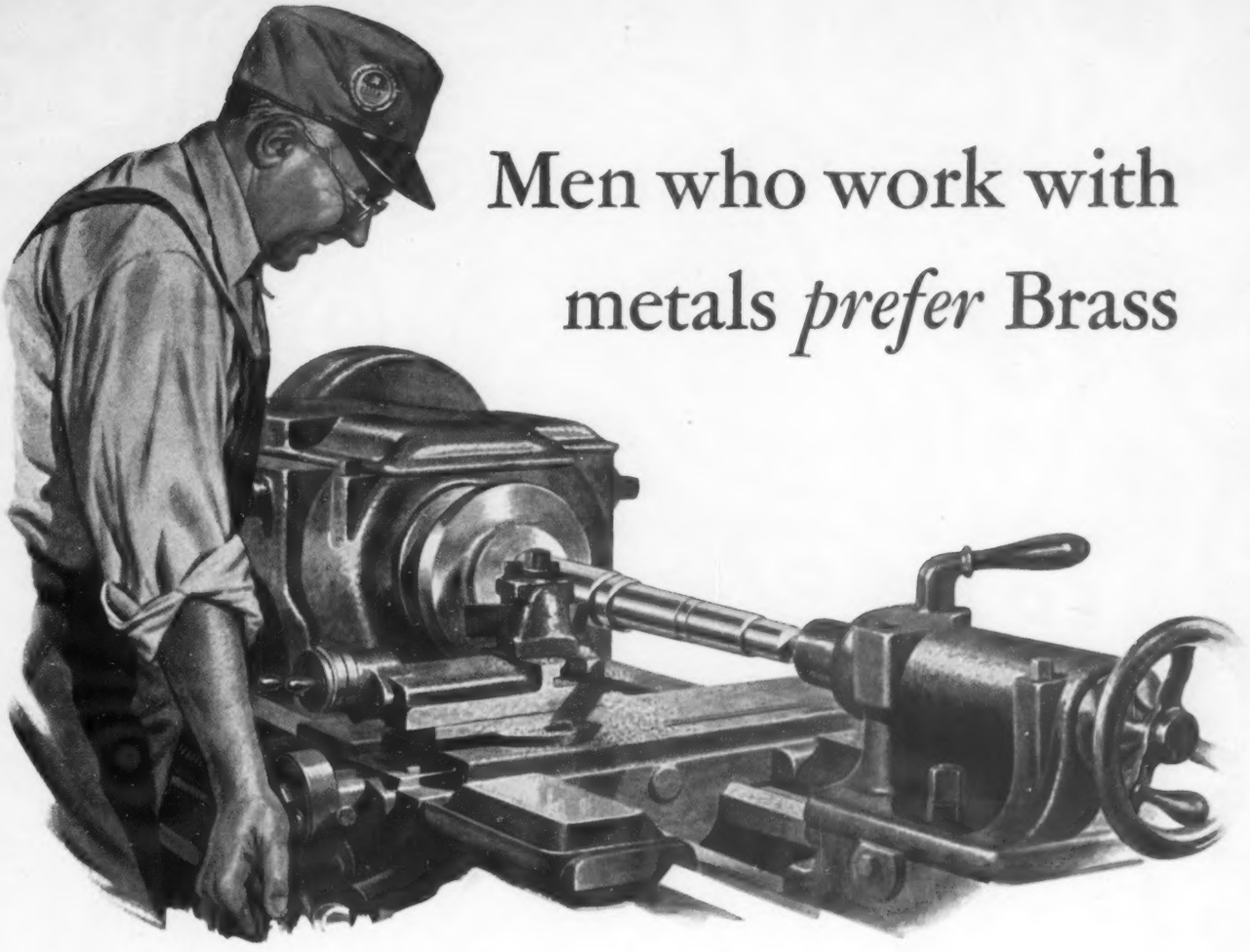
Variable Speed Drive flexibly meets the needs of various jobs.

A Selection of Controlled Atmospheres is available.

Metal assemblies typical of those which can be produced at drastically lowered costs in these furnaces are illustrated. Let our engineers give you the complete story. LINDBERG ENGINEERING COMPANY, 2466 West Hubbard Street, Chicago 12, Illinois.

LINDBERG FURNACES

SUPER-CYCLONE • CYCLONE • HYDRYZING • BRAZING



Men who work with metals *prefer* Brass

AND FOR GOOD REASONS, TOO! Brass is strong, durable, workable and dependable. It machines readily and takes an excellent finish. On lathe or milling machine, brass lends itself equally well to heavy roughing operations or high speed finishing cuts.

● For the manufacture of screw machine products, the preference for brass has been established over the years. Multiple and complicated machining operations are being performed economically on modern high speed automatics day after day—in thousands of screw machine shops.

● The ductility of brass makes it the ideal metal for press-drawn products as evidenced by its widespread use for cupping and deep-drawing operations. And what better material than brass for the rapid and accurate production of blanked, stamped or coined parts?

● On drill press or tapping machine, brass is in a class by itself, and any operator can tell you why: Holes drill faster, drills need fewer grindings; reamers hold their size longer and leave mirror-smooth holes; taps operate at higher speeds and produce clean-cut, accurate threads.

● Yes, brass *is* a workable metal. It can also be rolled, spun, soldered, brazed or welded. Having an attractive color of its own, brass also serves as an excellent, rust-free base metal for almost any applied finish.

● The uniformity and dependability of brass means faster, more efficient production—lower

Continued on next page

THE AMERICAN BRASS COMPANY

General Offices: Waterbury 88, Connecticut • Subsidiary of Anaconda Copper Mining Company
In Canada: ANACONDA AMERICAN BRASS LTD., *New Toronto, Ontario*

ANACONDA

Anaconda Brass Mill Products

All these, and others, too—*from a Single Source of Supply*

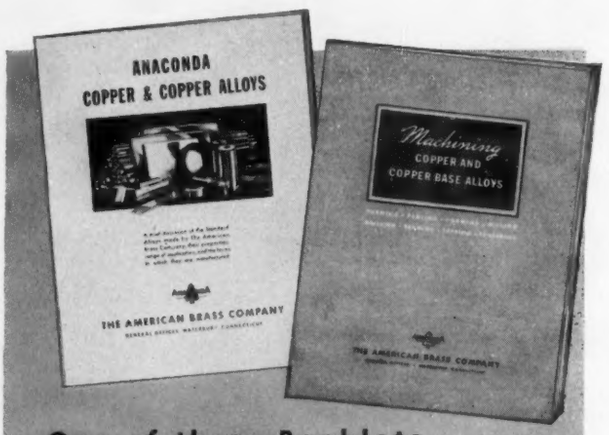
Continued from preceding page

overall costs and higher overall quality. It has proved to be the most economical metal to use for a thousand and one parts and products—from brass butts to brass buttons.

● The American Brass Company produces copper, brass, bronze and nickel silver in all standard compositions and in practically all commercial forms. With the composition, grain size and temper adjusted to the requirements, these metals are readily adaptable to most production methods and equipment.

● For applications requiring unusual physical or corrosion resistant properties, The American Brass Company is prepared to supply a special copper alloy such as Avialite*, Beryllium Copper, Tobin Bronze* or its high strength copper-silicon alloys, Everdur*. Your inquiries regarding the properties and applications of Anaconda Metals will receive the close attention of the Company's Technical Department. *Reg. U. S. Pat. Off.

46166



One of these Booklets may make your job easier

Publication B-28, "*Anaconda Copper & Copper Alloys*", a 40-page booklet, discusses the standard alloys made by The American Brass Company, their properties, range of applications, and the forms in which they are manufactured.

Publication B-3, "*Machining Copper and Copper Base Alloys*", is a 32-page booklet giving machinability ratings and suggested speeds, feeds, tool rakes and clearances for basic machining operations. Cutting tool materials are also discussed.

Either one or both of these booklets are available without cost, address:

THE AMERICAN BRASS COMPANY
General Offices: Waterbury 88, Connecticut

ANACONDA

Anaconda Copper & Copper Alloys

FOR LESS THAN 1¢

you can keep 100 parts like this

RUST-FREE during operations

Fingerprints, acid fumes and high humidity all cause corrosion right on the production line itself—corrosion which is not halted even though a permanent rust preventive is later applied before packaging and shipment.

That's why many concerns, having learned to their sorrow what rust costs, use *Cosmoline* Fingerprint Neutralizer as a protective dip between manufacturing operations. This product has water-displacing properties, hence is especially good after machining or cleaning operations.

When you consider the high cost of a finished part, as against the tiny cost of protecting it through the shop, you'll see why Cosmoline Neutralizer is good insurance. Write for circular and prices.

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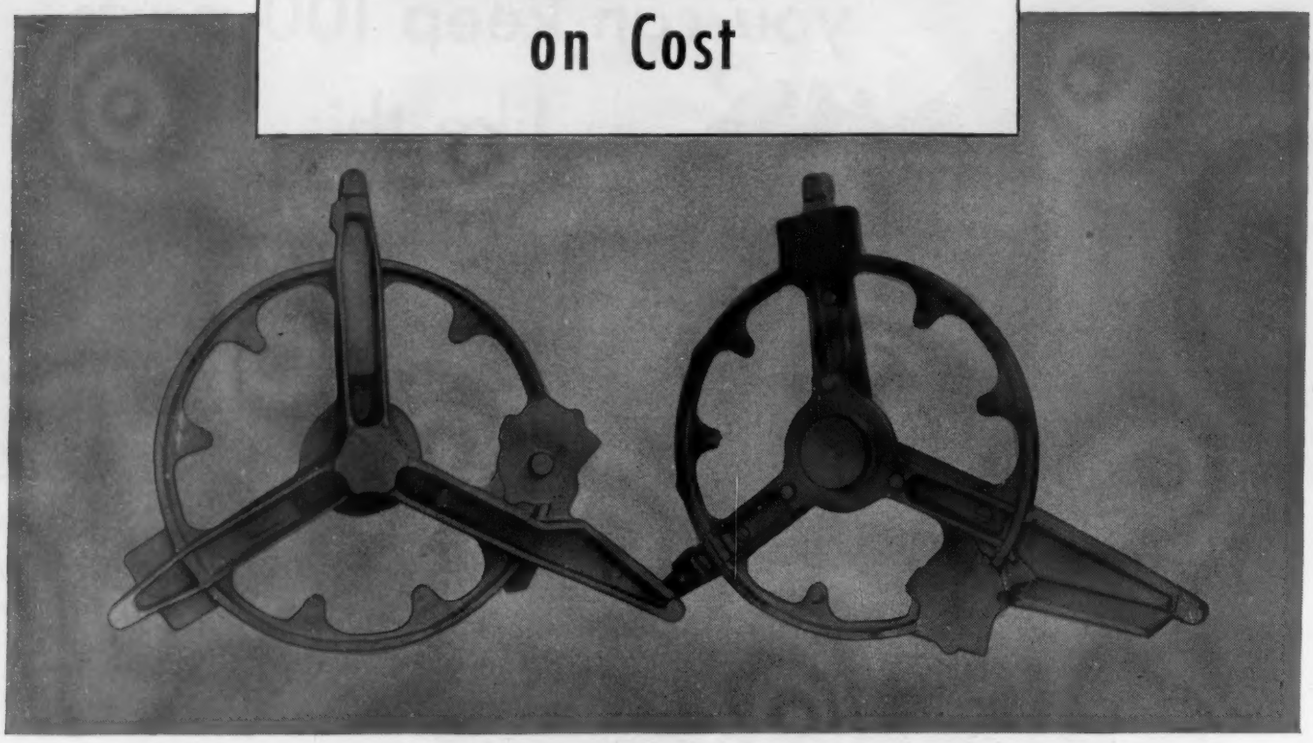
Service and sales in all principal cities

HOUGHTON'S
COSMOLINE
FINGERPRINT NEUTRALIZER

Throwing Light on Cost



THESE CASTINGS THROW LIGHT—TWO WAYS

As bases for Army-Navy searchlights, they became military tools; they are throwing light for both war and peace.

As complicated alloy steel castings, they throw new light on cost of production, for they accomplish their purpose at far lower cost than would be possible by any other method of turning out equivalent parts.

The Army and Navy are discriminating buyers. They demand quality above all else. But in steel castings you get quality plus economy—real competitive advantages for your product.

New techniques, developed through research, enable the steel foundry to combine parts into one-piece castings. That saves assembly cost, reduces machining and finishing and improves the quality of the finished product.

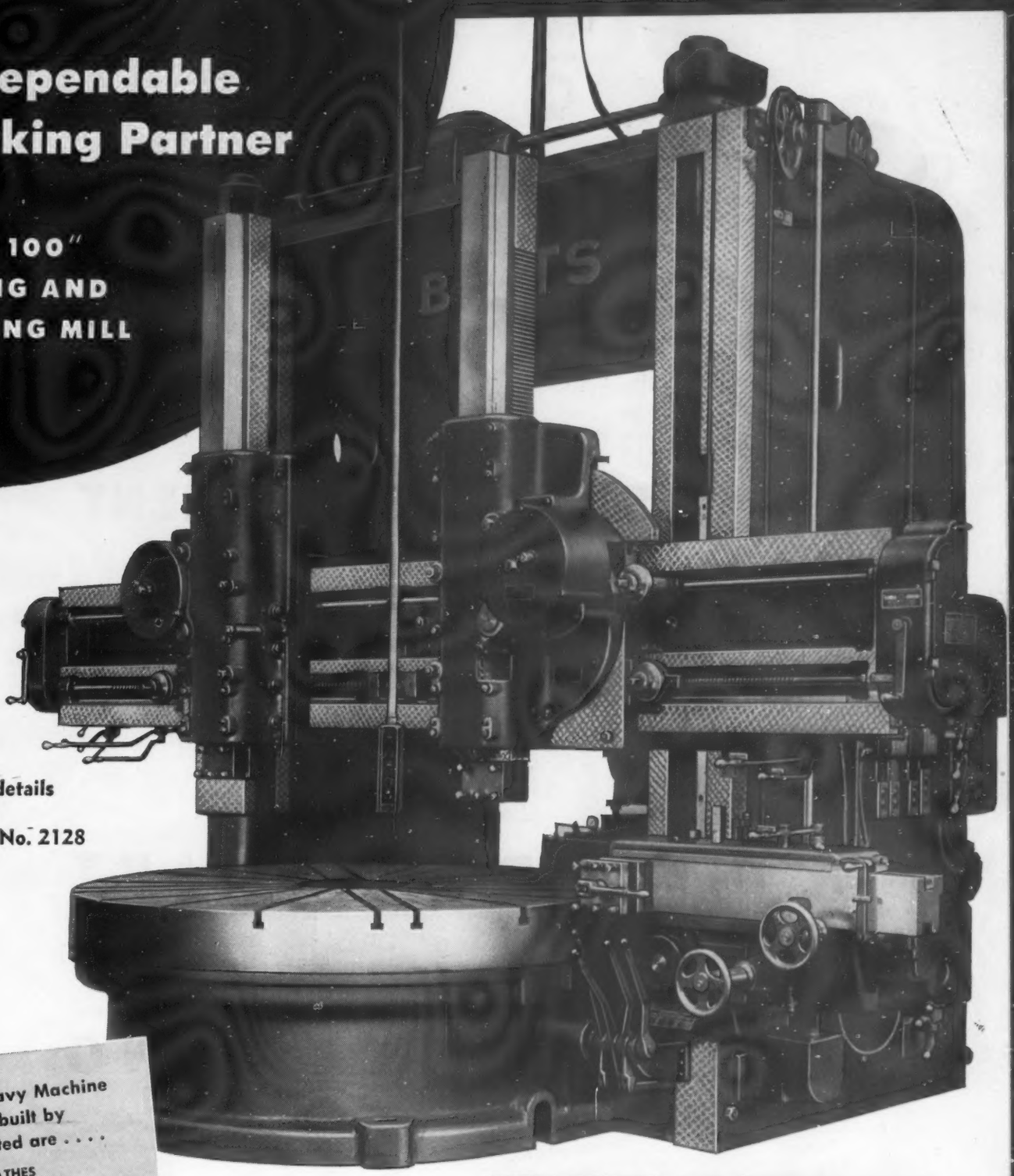
Have you analyzed your costs to see how steel castings can help you build better products at lower cost? Your steel foundryman will gladly work with you—to save money. Or, without obligation, write to Steel Founders' Society, 920 Midland Building, Cleveland 15, Ohio.

MODERNIZE AND IMPROVE YOUR PRODUCT WITH

STEEL CASTINGS

A Dependable Working Partner

**BETTS 100"
BORING AND
TURNING MILL**



**For full details
send for
Bulletin No. 2128**

Among Heavy Machine Tools built by Consolidated are . . . .

LATHES
BORING MILLS
DRILL PRESSES
MILLING MACHINES
BORING MACHINES
COLD SAW MACHINES
PLANERS
SLOTTERS
RAILROAD SHOP TOOLS
AUTOMOTIVE TOOLS
AND OTHER
SPECIAL MACHINES

**BETTS BORING AND TURNING MILLS
are built from 100" up to any requirement**

As in all Betts machines, the accumulated experience of more than three-quarters of a century is built into this general purpose boring mill . . . another striking example of Consolidated's ability to combine accuracy and power with maximum productiveness.

BUILDERS OF HEAVY DUTY MACHINE TOOLS SINCE 1861

BETTS • BETTS-BRIDGEFORD • NEWTON • COLBURN • HILLES & JONES • MODERN

CONSOLIDATED MACHINE TOOLS

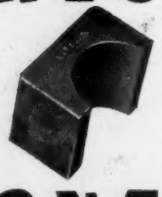
CONSOLIDATED
MACHINE TOOL CORPORATION

ROCHESTER 10, NEW YORK

N·B·M ENGINEERING SKILL

THE INVISIBLE INGREDIENT

THAT MAKES EVERY



N·B·M BRONZE PART

A BETTER CASTING

NBM

NATIONAL BEARING

DIVISION

ST. LOUIS • NEW YORK

AMERICAN Brake Shoe COMPANY

PLANTS IN: ST. LOUIS, MO. • PITTSBURGH, PA. • MEADVILLE, PA. • JERSEY CITY, N. J. • PORTSMOUTH, VA. • ST. PAUL, MINN. • CHICAGO, ILL.

PLYMOUTH LOCOMOTIVES FOR SPECIALIZED JOBS

Intraplant transportation is a major problem in an ore smelting and refining plant. Materials must be moved between processes on exact schedules, specially-equipped cars are required to meet unusual operating conditions. But here, as in any other specialized operation, Plymouth Locomotives provide dependable, low-cost service, doing the most difficult jobs with ease.

The Plymouth Locomotive illustrated is now in its tenth year of service at a West Coast smelting plant. The 10-ton "little giant" operates on a 36 inch gauge track and, because it is compact and maneuverable, it is exceptionally easy to operate, permits quick, accurate spotting of cars that keeps production flowing evenly throughout the plant.

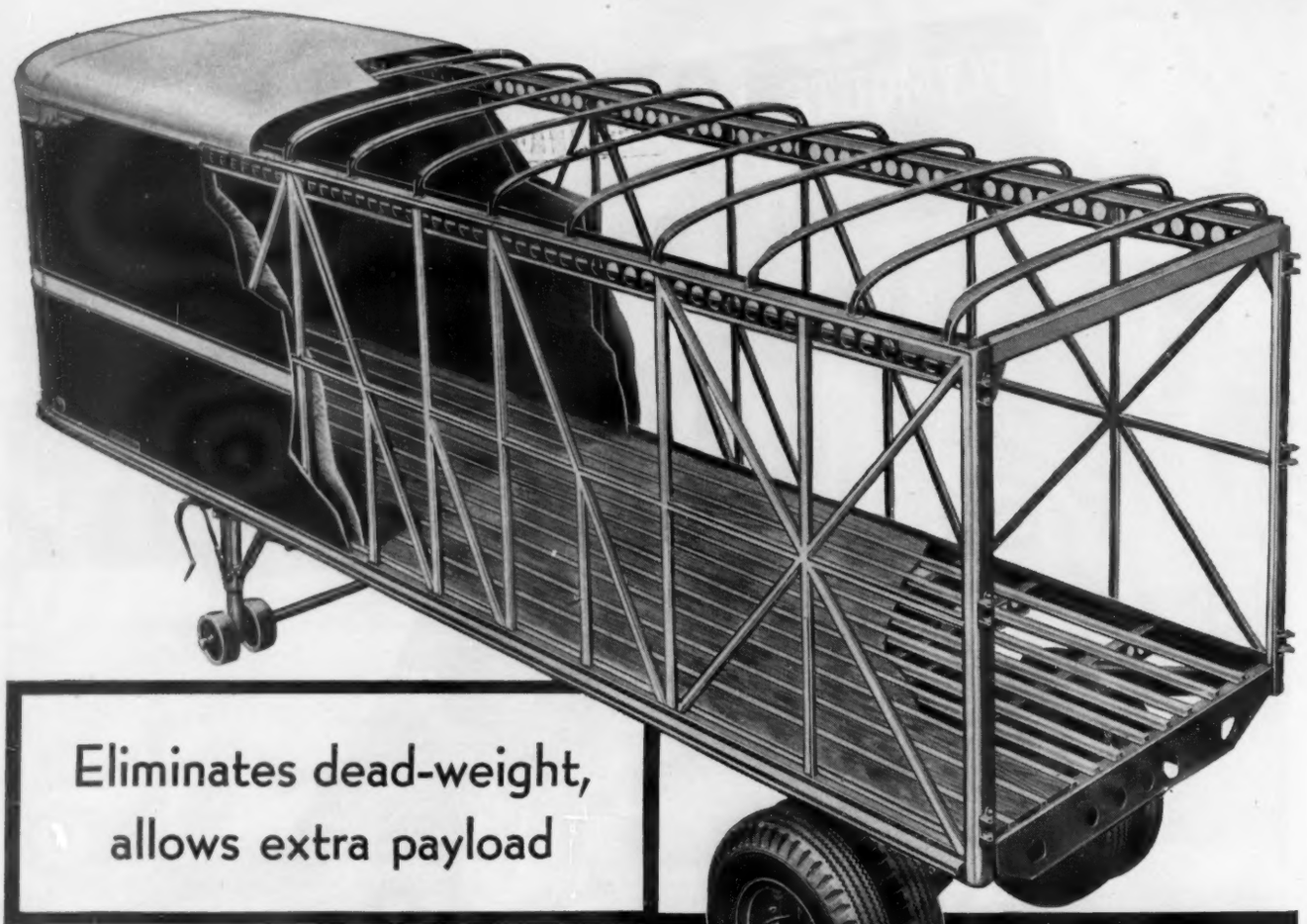
Designed and built for tough, day-in-and-day-out service, this Plymouth has provided an efficient solution to a difficult, specialized haulage problem. Your problem, unusual as it may be, can be solved with equal efficiency. Write today, outline your requirements . . . we'll gladly furnish the facts about Plymouth intraplant transportation.

TRACK HAULAGE . . . IS CHEAPER HAULAGE

PLYMOUTH LOCOMOTIVES

GASOLINE, DIESEL MECHANICAL AND DIESEL ELECTRIC

PLYMOUTH LOCOMOTIVE WORKS • Division of The Fate-Root-Heath Co., Plymouth, Ohio, U.S.A.



Eliminates dead-weight, allows extra payload

THIS framework of low-alloy, high-tensile steel increases the carrying capacity of Fruehauf's big Aerovan. As shown here, structural members are slender and light in weight, yet they are extremely tough and corrosion resistant. Members of carbon steel, to be equally as durable, would necessarily be much thicker and heavier.

An ideal steel, used in this and similar types of construction, is Youngstown's Yoloy --a nickel-copper alloy of outstanding toughness and also high in corrosion resistance. Yoloy's greater strength permits maximum weight saving which can quickly result in increased revenue from bigger payloads. And its remarkable ability to resist corrosion recommends Yoloy especially for vehicles and equipment that must perform in severely corrosive service.

This high-tensile steel is now available in sheets, plates, strip, bars and tubular products. Write, wire or phone us for full information on Yoloy.

Owners of the Fruehauf Aerovan find it a more profitable trailer to operate because they haul less dead-weight and more payload. Photos by courtesy of Fruehauf Trailer Co., Detroit

QUALITY TRADE MARK YOUNGSTOWN SERVICE

YOUNGSTOWN

THE YOUNGSTOWN SHEET AND TUBE COMPANY

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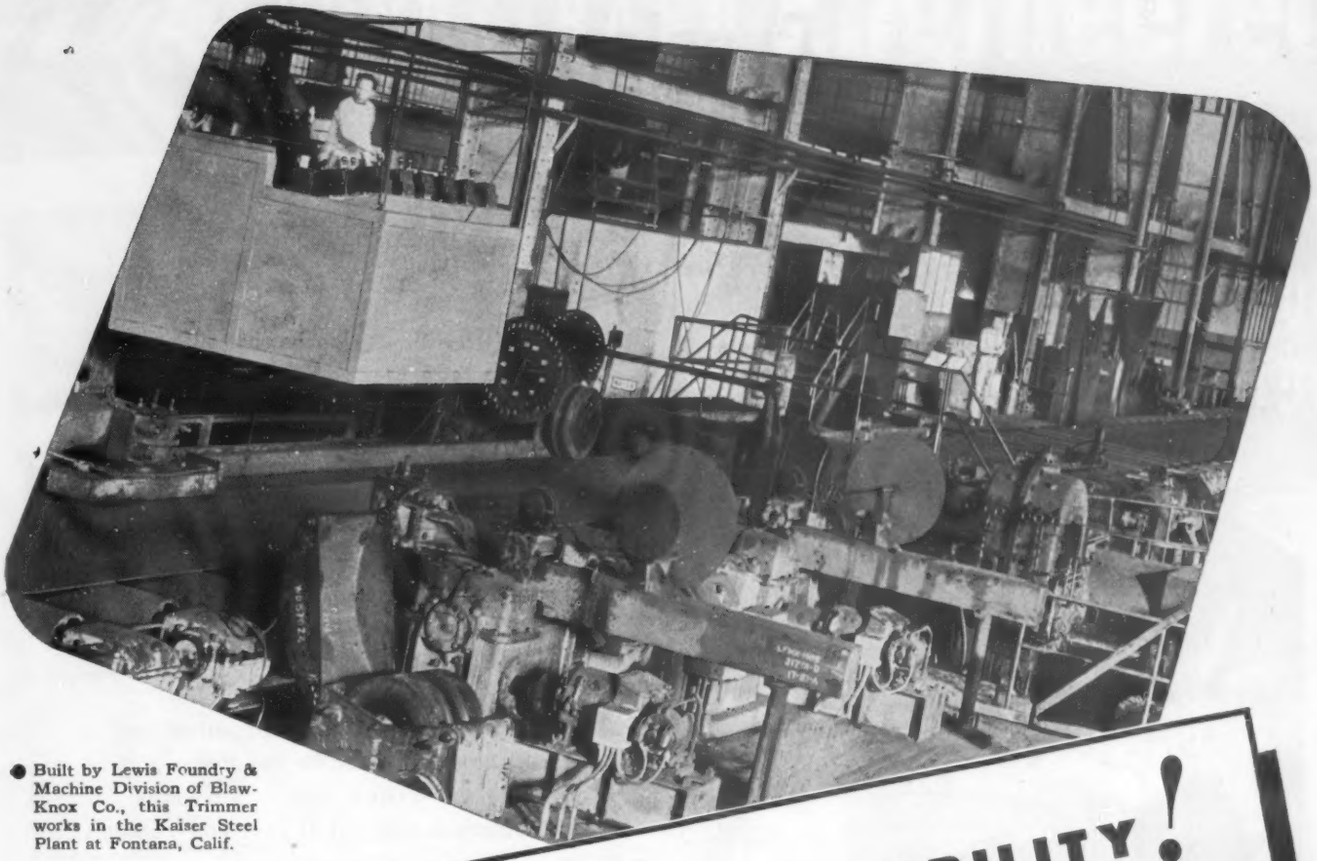
CARBON - ALLOY AND YOLOY STEELS

Sheets-Pipe and Tubular Products-Plates-Conduit-Bars-Coke Tin Plate-Electrolytic Tin Plate-Rods-Wire-Nails-Tie Plates and Spikes.



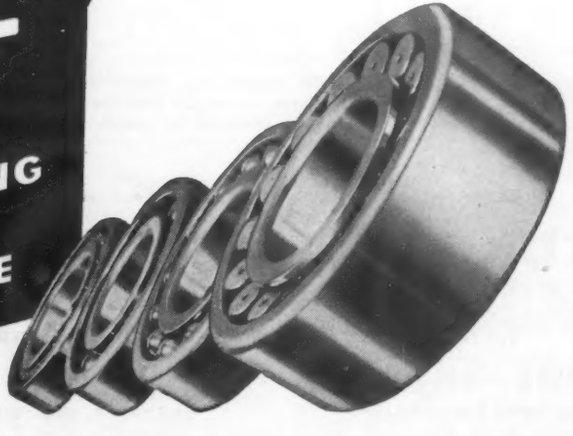
● Built by Lewis Foundry & Machine Division of Blaw-Knox Co., this Trimmer works in the Kaiser Steel Plant at Fontana, Calif.

FOR *Trimmer* RELIABILITY!

SKF Spherical Roller Bearings, with their rolling alignment, assure equalized load distribution that means full capacity for useful work. They require a minimum of lubrication and never need adjustments. On this 110″ Rotary Side Trimmer, this permits accurate adjustment of the overhung knives . . . freedom from bearing trouble . . . low maintenance. For further information, refer to our catalog, 'Steel Mill Data for Calculation and Design,' or write direct. 5986

SKF INDUSTRIES, INC., PHILA. 34, PA.

SKF
Puts the
RIGHT BEARING
in the
RIGHT PLACE



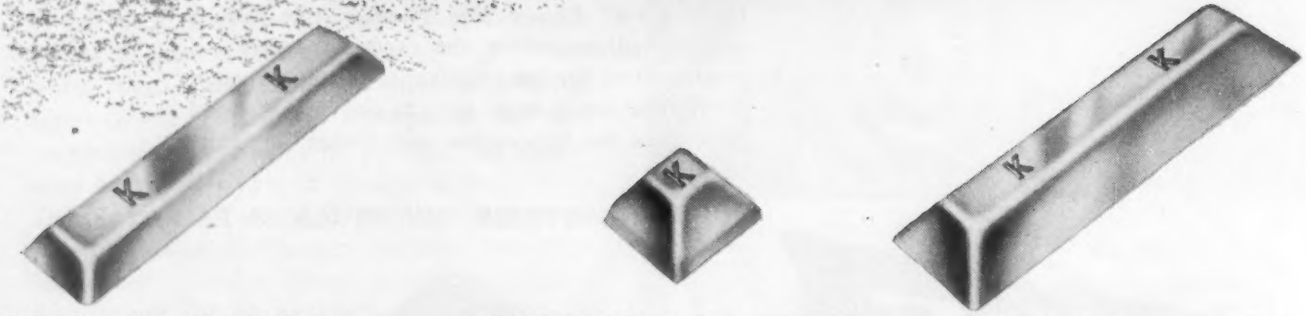
Cupola or open hearth!

FOUNDRIES . . . Charge that cupola with Keokuk Electro-Silvery!
STEEL MILLS . . . Block that heat with Keokuk Electro-Silvery!

Here's the best way to add silicon! Keokuk Electro-Silvery, both *standard and alloy*, is manufactured under complete and constant control. This assures extremely accurate percentages of silicon, iron and other alloys, as desired—providing you with highest uniformity obtainable. Economical and time-saving! All can be handled by magnet. Write today . . . a Keokuk metallurgist will call at your convenience.

KEOKUK ELECTRO-Silvery

(HIGH SILICON PIG IRON)



30-lb. pigs for charging the cupola.

12½-lb. piglets for foundries so uniform in weight that they may be charged by count.

60-lb. pigs for blocking in the open hearth.

Write for full information and prices on Keokuk Electro-Silvery!

KEOKUK ELECTRO-METALS COMPANY

KEOKUK, IOWA

For 30 Years . . . Electro-Silvery and Other Ferro-Alloys

Sole Agents: MILLER AND COMPANY, 332 S. Michigan Ave., Chicago 4, Illinois

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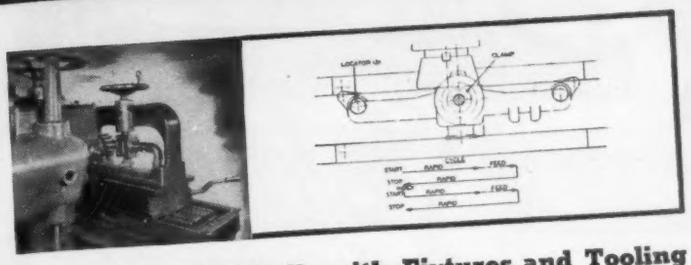
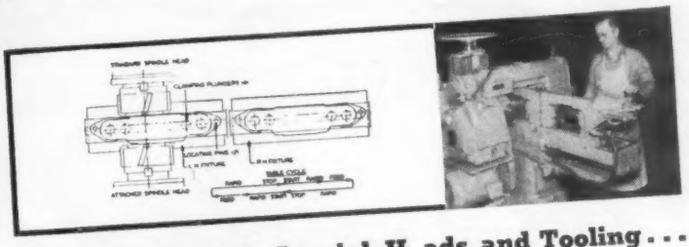
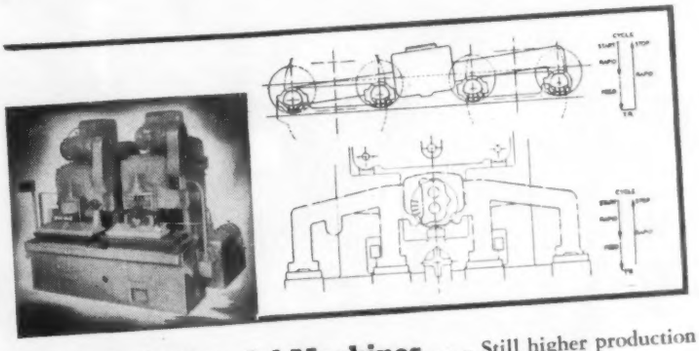
How SUNDSTRAND Engineered Production WILL IMPROVE YOUR MILLING METHODS



1 Standard Rigidmils with Fixtures and Tooling to Suit Your Work . . . Here's a relatively low production job solved with a *standard* Sundstrand Rigidmil. Accuracy requirements dictated that the opposed surfaces be milled with only one handling of the part. A simple clamping fixture mounted on a standard manually indexed base makes it unnecessary to unclamp and reclamp part between cuts.



2 Rigidmils with Special Heads and Tooling . . . Here's a different solution to a similar problem requiring higher production. A standard Rigidmil is provided with an outboard head so that both faces can be machined simultaneously. Two fixtures are used, one at each end of the table. One part is machined while the opposite fixture is being unloaded and loaded.



3 Entirely Special Machines . . . Still higher production requirements resulted in this machine, a Sundstrand Special Twinplex Rigidmil. Four spindle head on L. H. column mills 4 ports. Single spindle head on R. H. column mills carburetor pad. Operator loads at one station while part is being machined at other station. Hydraulic clamping speeds up loading. Fixture automatically retracted on return stroke of head so that cutters do not drag over finish milled surface. Automatic chip conveyor removes chips to end of machine.

ONE OF THESE 3 METHODS WILL BE MOST ECONOMICAL FOR YOUR PRODUCTION MILLING JOB . . .

Here are three different manifold milling jobs. Although they have different production and tooling requirements, each problem has been solved with a minimum of equipment. That's Sundstrand *Engineered* production . . . a method of solving production milling problems with: (1) standard machines, or: (2) standard machines with special heads and fixtures to suit the job, or: (3) entirely special machines which warrant their application due to production requirements and the inability of standard equipment to solve the problem economically.

At the left is a brief outline of our complete engineering and manufacturing service to meet any of your production milling requirements in small and medium size work. One of these methods may be the solution to your present problem.

MORE PROOF *Free*

More proof of the successful application of Sundstrand "engineered" milling production is contained in this new book. Over 60 problem solutions complete with tooling diagrams are included. Write for your copy today. Ask for Bulletin No. 746.

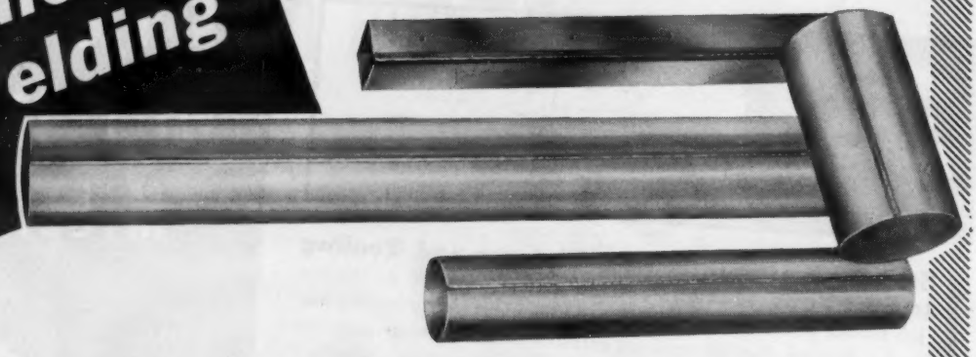
SUNDSTRAND MACHINE TOOL CO. ROCKFORD, ILLINOIS U.S.A.

SUNDSTRAND MACHINE TOOL COMPANY

2540 Eleventh Street, Rockford, Illinois, U. S. A.

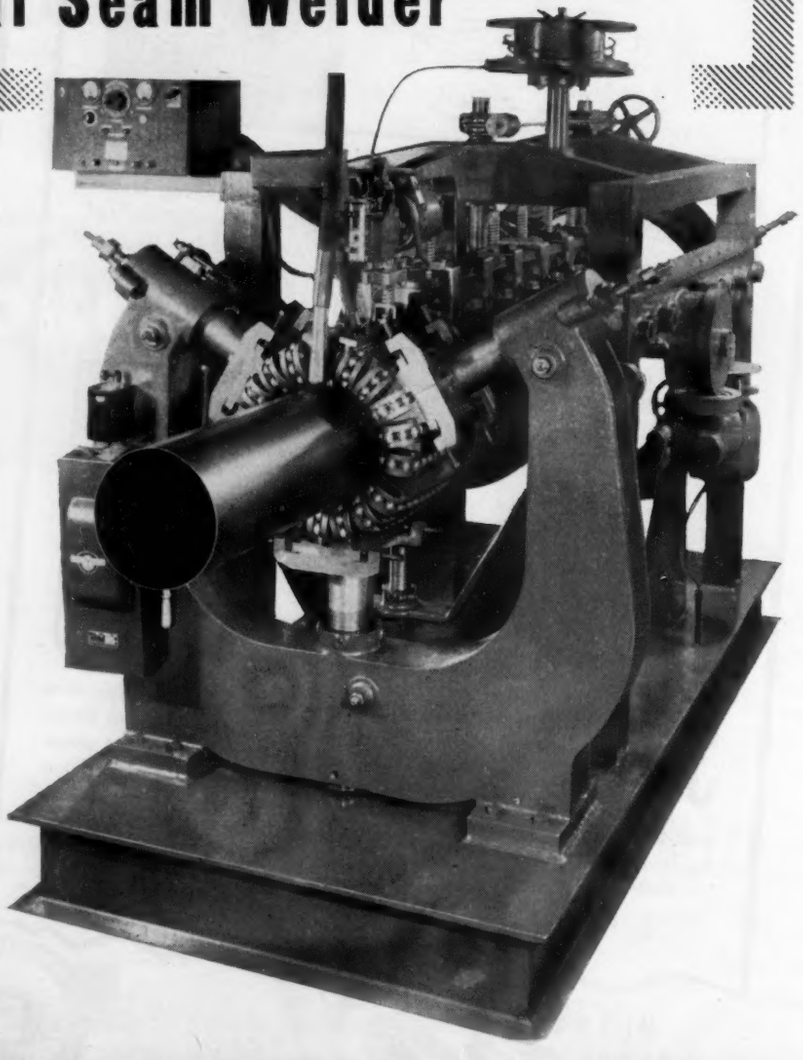
RIGIDMILLS • AUTOMATIC LATHES • SPECIAL MILLING AND TURNING MACHINES

for a Quicker Better Welding Job . . .



Berkeley Continuous

Longitudinal Seam Welder



Only with the "Berkeley" can you get welding speeds up to 250 in. per minute . . . not just for one welding job, but all day long.

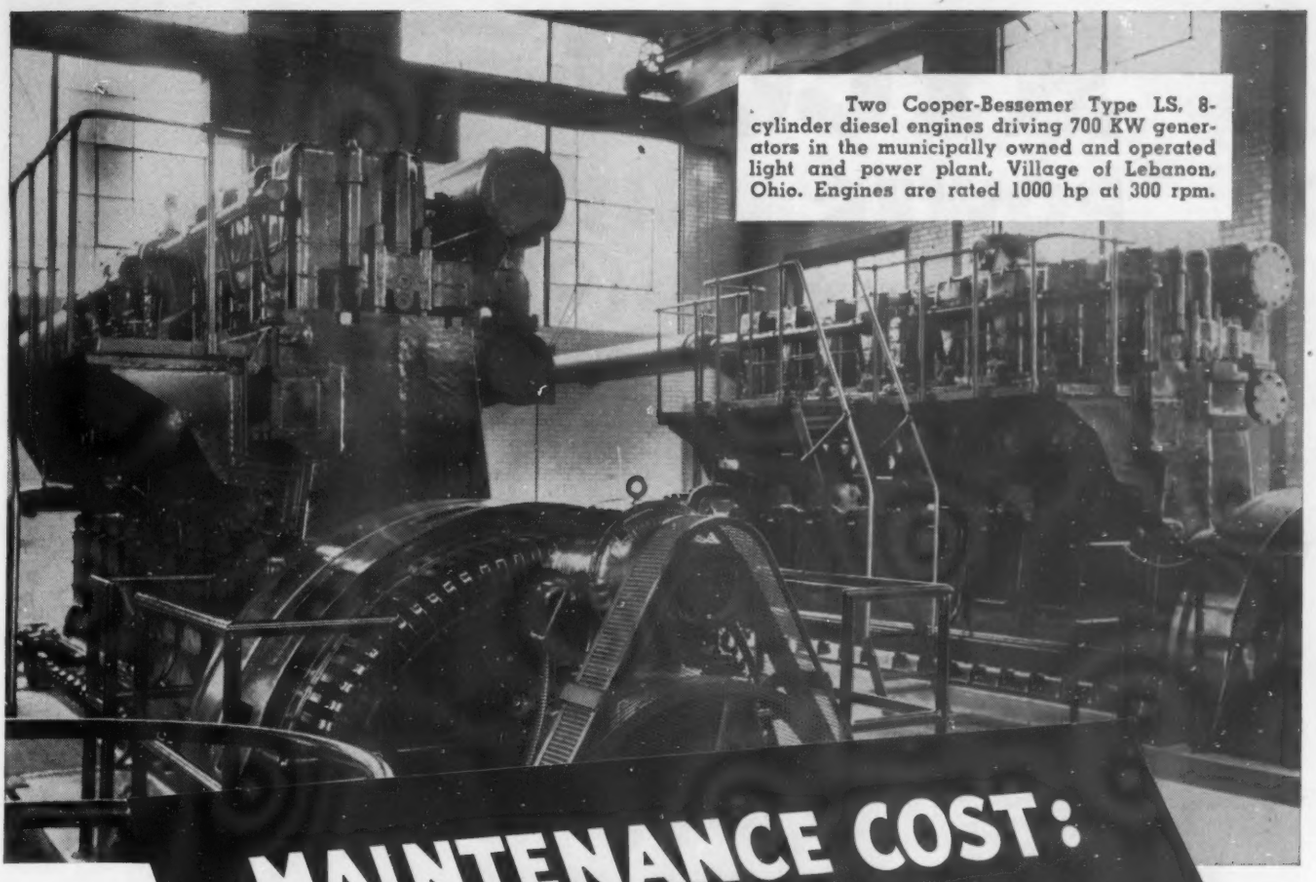
Preformed tubes, 4" to 36" in diameter, are fed into the back of the fixture and emerge at the opposite end a completed product . . . with continuous, uniform welds, of X-ray quality that require no finishing.

For rounds, squares and a variety of shapes, there's no substitute for the "Berkeley" used in combination with the automatic submerged electric arc.

Model illustrated is Type 2C. Will handle preformed tubes 10" to 20" in diameter.

Write us today for details regarding the best type for your purpose.

PENN TOOL & MACHINE CO.
DANVILLE, ILLINOIS



Two Cooper-Bessemer Type LS, 8-cylinder diesel engines driving 700 KW generators in the municipally owned and operated light and power plant, Village of Lebanon, Ohio. Engines are rated 1000 hp at 300 rpm.

MAINTENANCE COST: less than 1% per year

THESE two Cooper-Bessemer diesels powering the Lebanon, Ohio, municipal power and light plant have been in continual service since November, 1941. Maintenance cost is averaging less than 1 percent of engine cost per year. Here is a typical example of the maintenance economy demonstrated time and again in Cooper-Bessemer installations.

How about operating economy and efficiency? Mr. L. F. Wertz, Lebanon's capable plant superintendent, says, "Our fuel bill runs less than ½ cent per KW generated. Last month lube oil consumption cost us only .015 cents per KW. Bonds issued to finance our new plant are being retired much faster than originally estimated due to the earnings made possible by the efficiency of our Cooper-Bessemer Diesels." Mr. Wertz might also tell you that power is delivered at a highly competitive rate and that village-consumed power, valued at $12,000 per year, is furnished free.

Modern, long-lived Cooper-Bessemer diesels are available in sizes and types for virtually all heavy-duty requirements, stationary or mobile. Contact the nearest Cooper-Bessemer office for complete details.

THE Cooper-Bessemer CORPORATION

Mt. Vernon, Ohio • Grove City, Pa.

New York, Washington, Gloucester, Dallas, Houston, St. Louis, Los Angeles, Seattle, San Francisco, and the Calmes Engineering Company, New Orleans, La.

BUILDERS OF DEPENDABLE ENGINES FOR 112 YEARS

HYCON
POWER UNIT

3000 P. S. I. CONTINUOUS DUTY

40″ long, 17″ wide, 25″ high

2.25 GPM 3000 P.S.I. Pump on Motor
10½″ OD Accumulator Mounted and Piped
on 20 Gal. Reservoir. Micronic Filter

A PACKAGED UNIT FOR ANY HYDRAULIC CIRCUIT

RECORD PRESSES • LABORATORY PRESSES • ARBOR PRESSES • JACKS • MACHINE TOOLS • APPLICATIONS REQUIRING LONG DWELL UNDER PRESSURE

EXPERIENCED HYDRAULIC ENGINEERS WILL CALL UPON REQUEST

THE NEW YORK AIR BRAKE COMPANY

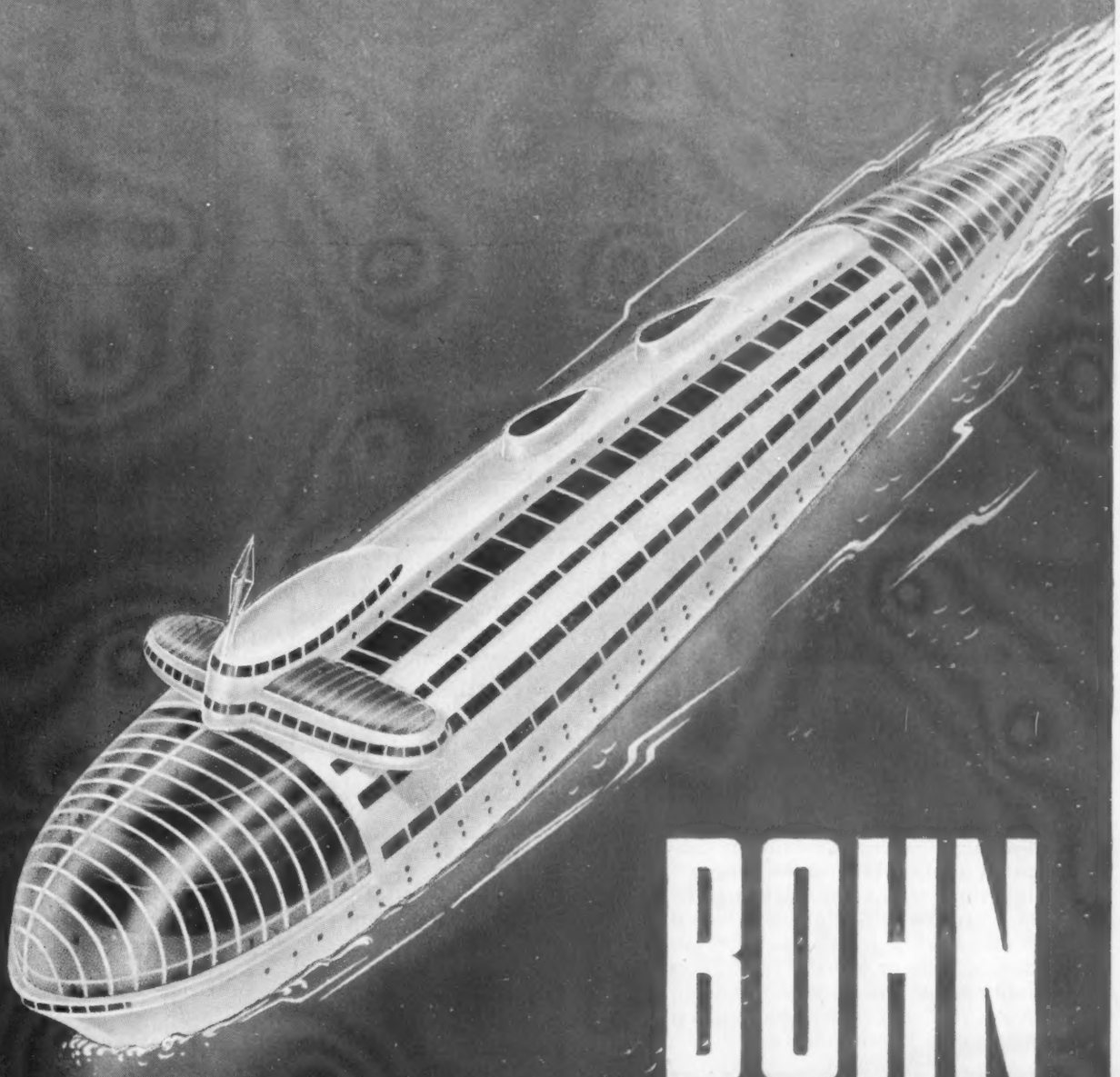
Hydraulic Division

420 Lexington Avenue, New York, 17, N. Y. • Factories Watertown, N. Y.

A NEW TRANSOCEANIC TREAT

Almost wasp-like in its appearance and streamlining is this designer's conception of one of the transoceanic liners of the future. Perhaps—because it combines strength with lightness—Bohn aluminum would play a part in the construction as in this illustration.

It is the combination of these qualities—in both aluminum and magnesium — that assures their wider, more extensive use in post-war products. The Bohn engineering staff would be glad to consult with you on possible applications in your own product.

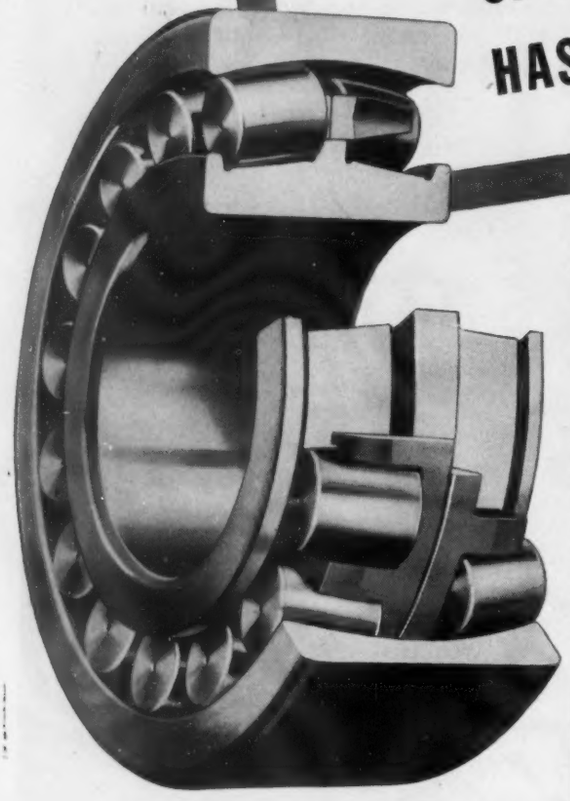


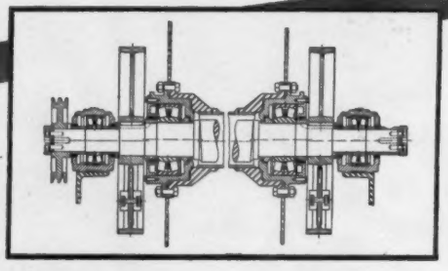
BOHN

BOHN ALUMINUM AND BRASS CORPORATION—GENERAL OFFICES—LAFAYETTE BUILDING—DETROIT 26, MICHIGAN

Designers and Fabricators—ALUMINUM • MAGNESIUM • BRASS • AIRCRAFT-TYPE BEARINGS

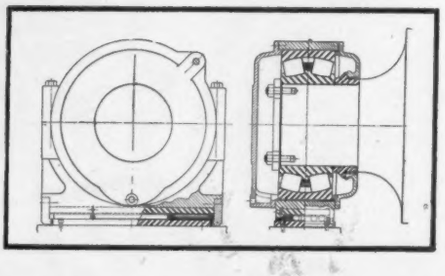
TORRINGTON SELF-ALIGNING SPHERICAL ROLLER BEARING HAS MANY APPLICATIONS





CONSTRUCTION... This X-section drawing shows a mounting of four Torrington Self-Aligning Spherical Roller Bearings on the main eccentric shaft of a shaker screen. The self-aligning feature of the bearings easily compensates for distortion and satisfactorily handles heavy shock loads.

PAPER... Shown here in X-section is a Torrington Self-Aligning Spherical Roller Bearing as applied to a paper calender bottom roll, with a ladder bearing utilized under the floating housing to permit it to move freely when the roll expands or contracts.

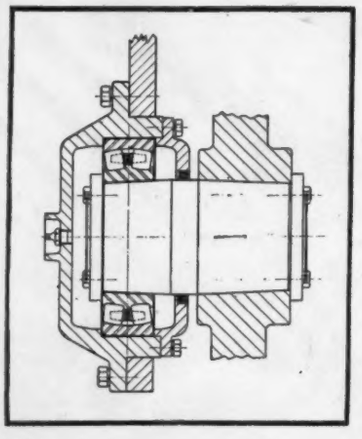


Of major importance to design engineers and users of machinery in which friction poses a serious problem is the versatility of the Torrington Self-Aligning Spherical Roller Bearing . . . .

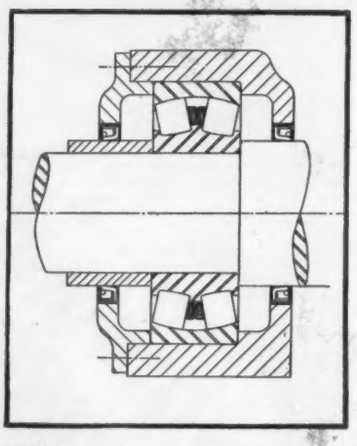
★

The engineering staff of Torrington's Bantam Bearings Division is prepared to offer you practical, cost-saving suggestions for adapting the high-capacity Self-Aligning Spherical Roller Bearing to the machines you design, build or operate. For further information write for our Bulletin No. 100A or contact your nearest Torrington Representative.

THE TORRINGTON COMPANY
BANTAM BEARINGS DIVISION
SOUTH BEND 21, INDIANA



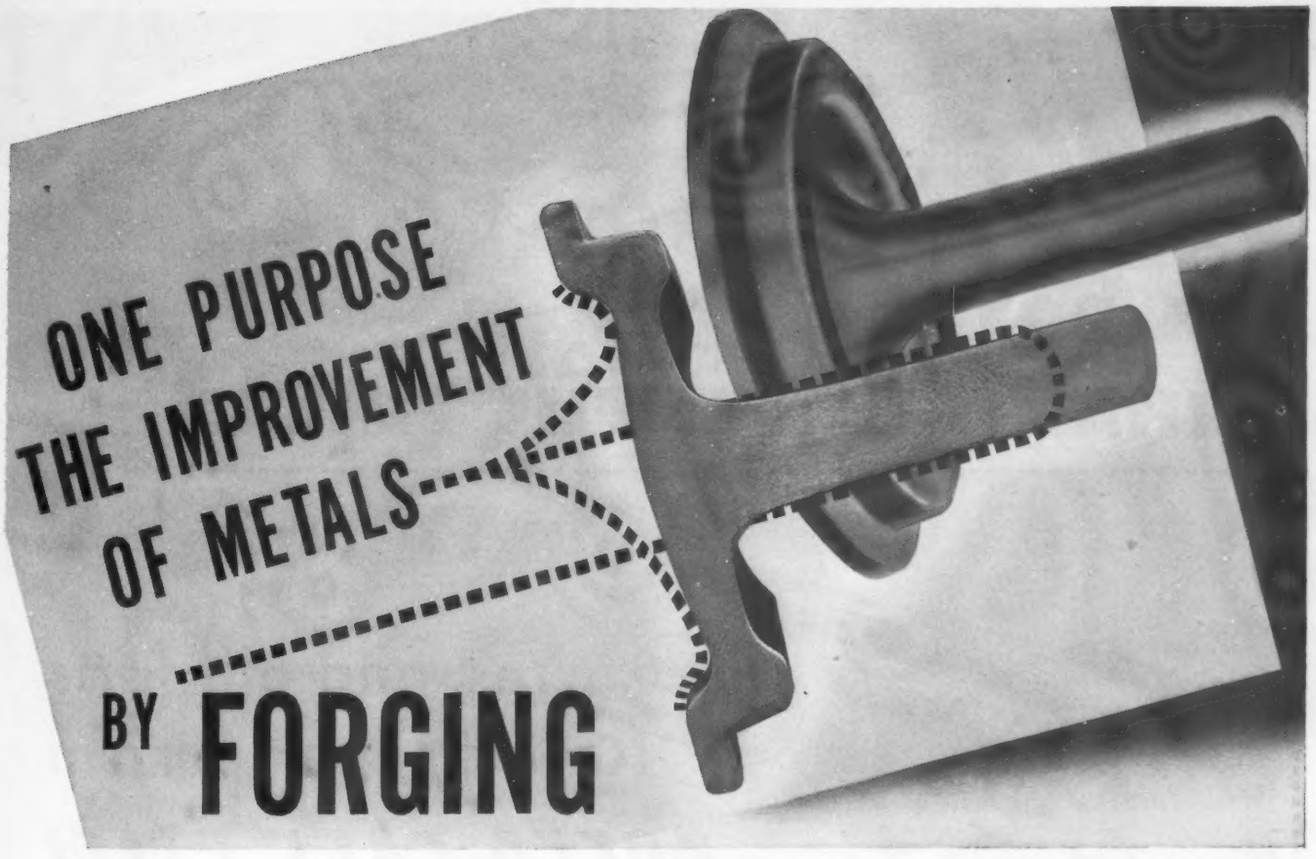
OIL... The accompanying drawing illustrates a wrist pin application of the Torrington Self-Aligning Spherical Roller Bearing as used for oil field pumping units. Distortion in the pitman does not affect the efficient functioning of the bearing in this mounting.



STEEL... X-Section drawing shows a typical arrangement for the Torrington Self-Aligning Spherical Roller Bearing in modern, high speed auxiliary equipment for steel mills. Temperature changes, misalignment and high load stresses do not affect the free-rolling action within the bearing.

TORRINGTON BEARINGS

SPHERICAL ROLLER • STRAIGHT ROLLER • TAPERED ROLLER • NEEDLE • BALL

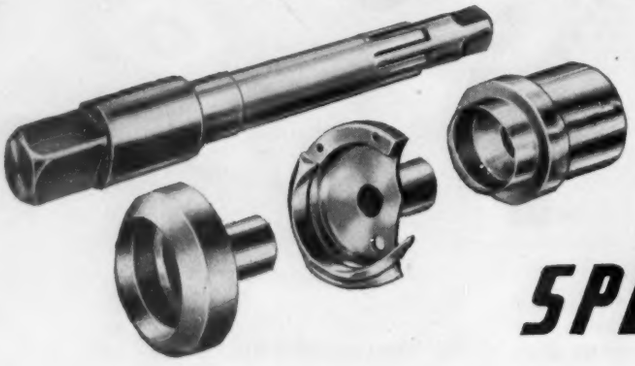


Forging metals in closed impression dies develops maximum metal quality, because by this process the grain structure and fibre-like flow lines inherent in wrought metals are controlled, directioned, and concentrated to meet the stresses, shocks and pressures which occur under actual service conditions. This forging illustrates how maximum metal quality has been developed. The wartime development of forging techniques by which numerous so-called "impossible-to-forge" designs were successfully forged may permit you to obtain maximum metal quality for parts of your product. A Steel Improvement Forging Engineer can show you how to obtain the maximum IMPROVEMENT OF METALS BY FORGING, and reductions in machining and processing costs. Consult him before the design of a part is fixed, and get the full benefit of 31 years of forging production experience.

THE STEEL IMPROVEMENT & FORGE CO.
942 East 64th Street CLEVELAND, OHIO

Reference Data Booklet presents many new ideas on forgings and their application in many different types of equipment. Copies available to engineers, metallurgists and executives.

OH BOY! WHAT A BEAUTIFUL FINISH



..Yes, and all parts machined from SPEED CASE STEEL

Have a beautiful finish, too . . . Even with a machinability of 250 surface feet per minute SPEED CASE X1515 produces parts with exceptional finish and you get a tool life from 2 to 5 times longer than when cutting other CARBURIZING STEELS like X1020-X1314-X1315, etc.

➧ Write for our Brochure which gives complete data and Case Histories furnished by our customers.

Tear this off . . . ATTACH TO YOUR LETTERHEAD AND MAIL TO EITHER COMPANY BELOW

Licensee for Eastern States

THE FITZSIMONS COMPANY

YOUNGSTOWN, OHIO

MANUFACTURERS OF COLD FINISHED CARBON AND ALLOY STEEL BARS

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MONARCH STEEL COMPANY

HAMMOND · INDIANAPOLIS · CHICAGO

PECKOVER'S LTD., Toronto, Canadian Distributor

THE PROPER CHOICE OF AN OIL SEAL IS AN ENGINEERING FUNCTION

For instance, you have a choice of sixteen different "Perfect" oil seal models, each to meet certain specific operating conditions.

Some of these operating conditions, which govern the selection of oil seals, are the surface speed of the shaft to be sealed, its possible eccentricity and end play, and its surface finish; the position of the shaft, vertical or horizontal; the operating temperature of the mechanism; the maximum difference in pressure on the two sides of the seal; the presence of grit or moisture on the outside of the seal; the character and chemical composition of the liquid to be sealed; the frictional load on the bearing; the distance from shaft drive to seal and the method of lubricating the sealing member.

In short, the choice of the most effective and economical seal for any given application is a special engineering problem. It's a wise precaution to have a Chicago Rawhide engineer check the decision before the seals are specified and ordered.

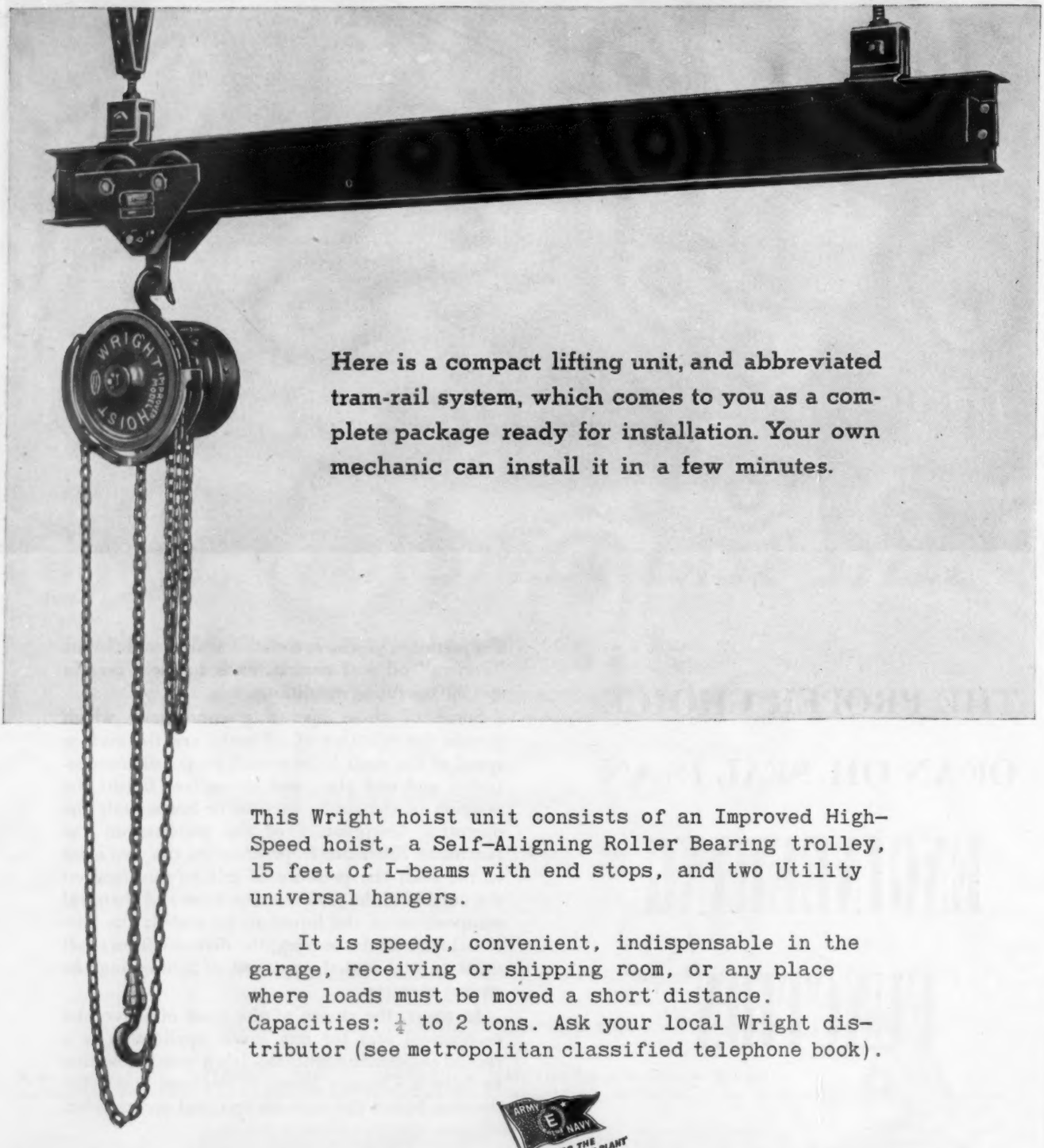
PERFECT" Oil Seal PATENTED

66 Years Manufacturing Quality Mechanical Leather Goods Exclusively and now Sirvene Synthetic Products

CHICAGO RAWHIDE MANUFACTURING CO.
1308 ELSTON AVE. • CHICAGO, ILL.

Philadelphia • Cleveland • New York • Detroit • Boston • Pittsburgh • Cincinnati

WRIGHT *HOIST UNIT*



Here is a compact lifting unit, and abbreviated tram-rail system, which comes to you as a complete package ready for installation. Your own mechanic can install it in a few minutes.

This Wright hoist unit consists of an Improved High-Speed hoist, a Self-Aligning Roller Bearing trolley, 15 feet of I-beams with end stops, and two Utility universal hangers.

It is speedy, convenient, indispensable in the garage, receiving or shipping room, or any place where loads must be moved a short distance. Capacities: ½ to 2 tons. Ask your local Wright distributor (see metropolitan classified telephone book).

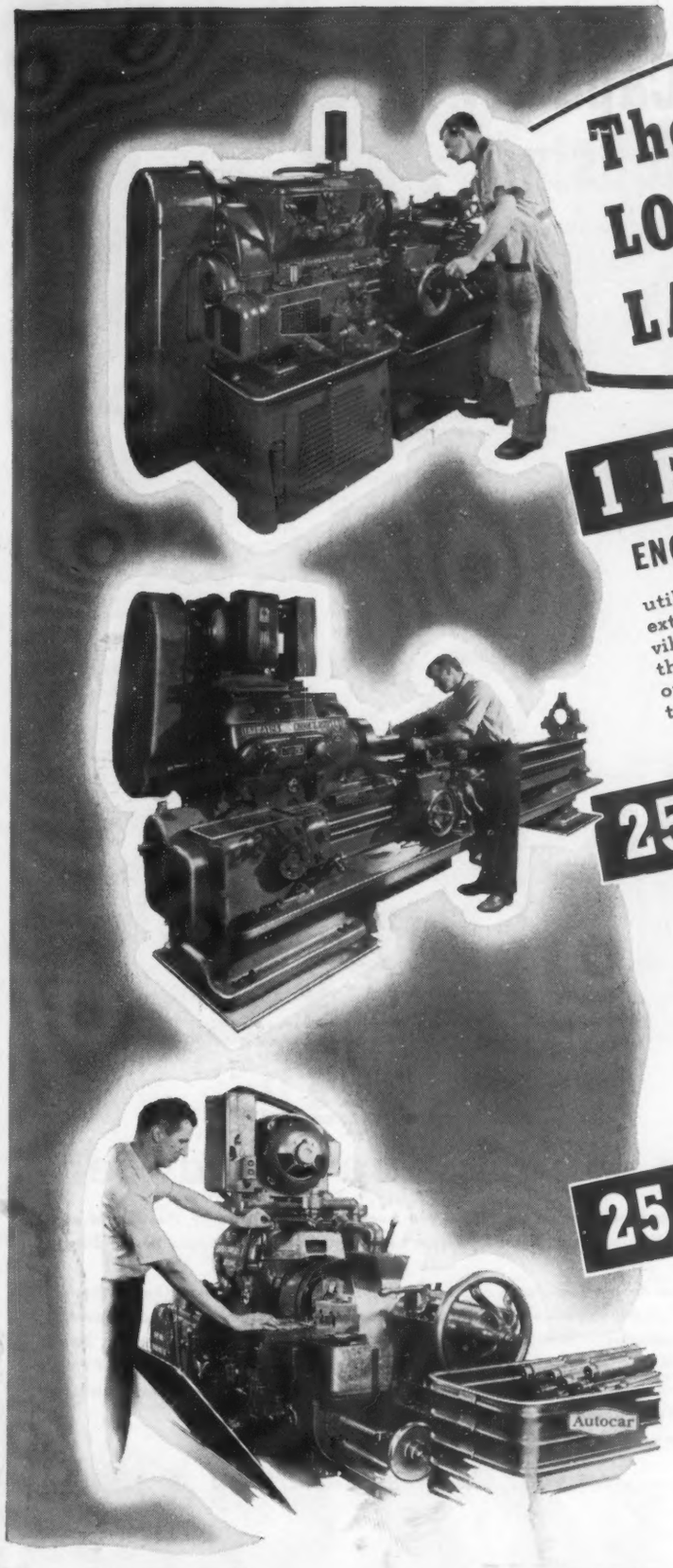
ACCO

York, Pa., Chicago, Denver, Los Angeles, San Francisco, Portland, New York, Bridgeport, Conn.

WRIGHT MANUFACTURING DIVISION
AMERICAN CHAIN & CABLE

TRADE MARK

In Business for Your Safety



There's a LODGE & SHIPLEY LATHE for

1 PIECE ... 12" TO 25"

ENGINE LATHES You can't beat these Engine Lathes for general utility on single piece jobs. They're built with extra rigidity, take heavy hogging cuts without vibration. As a result, you can demand more from these lathes and get it—in much less time. Write on your company letterhead for detailed literature No. 500, 503, 605.

25 PIECES ... 12" TO 25"

MANUFACTURING LATHES give you remarkable time savings on repetitive work in large or small lots. Manufacturing attachments form a profitable production unit. These permit multiple tooling and easy, rapid duplication of lengths and diameters. An L & S Manufacturing Lathe need never be idle—it's an engine lathe for single piece jobs, rivals an automatic on production work. Write for detailed literature No. 608, 615

25,000 PIECES

2A OR 3A DUOMATICS are fully automatic, even on complex multiple tool jobs. So easy, any unskilled operator can handle one or more of these lathes. You just put in the workpiece, start the cycle, take the piece out when finished. It's like two lathes in one, with front and rear carriages and tool slides, operated singly or together. A Duomatic turns thousands of pieces with amazing savings in time and effort. The 2A is for small jobs, the 3A for larger work. Write for detailed literature No. 601 and 620.

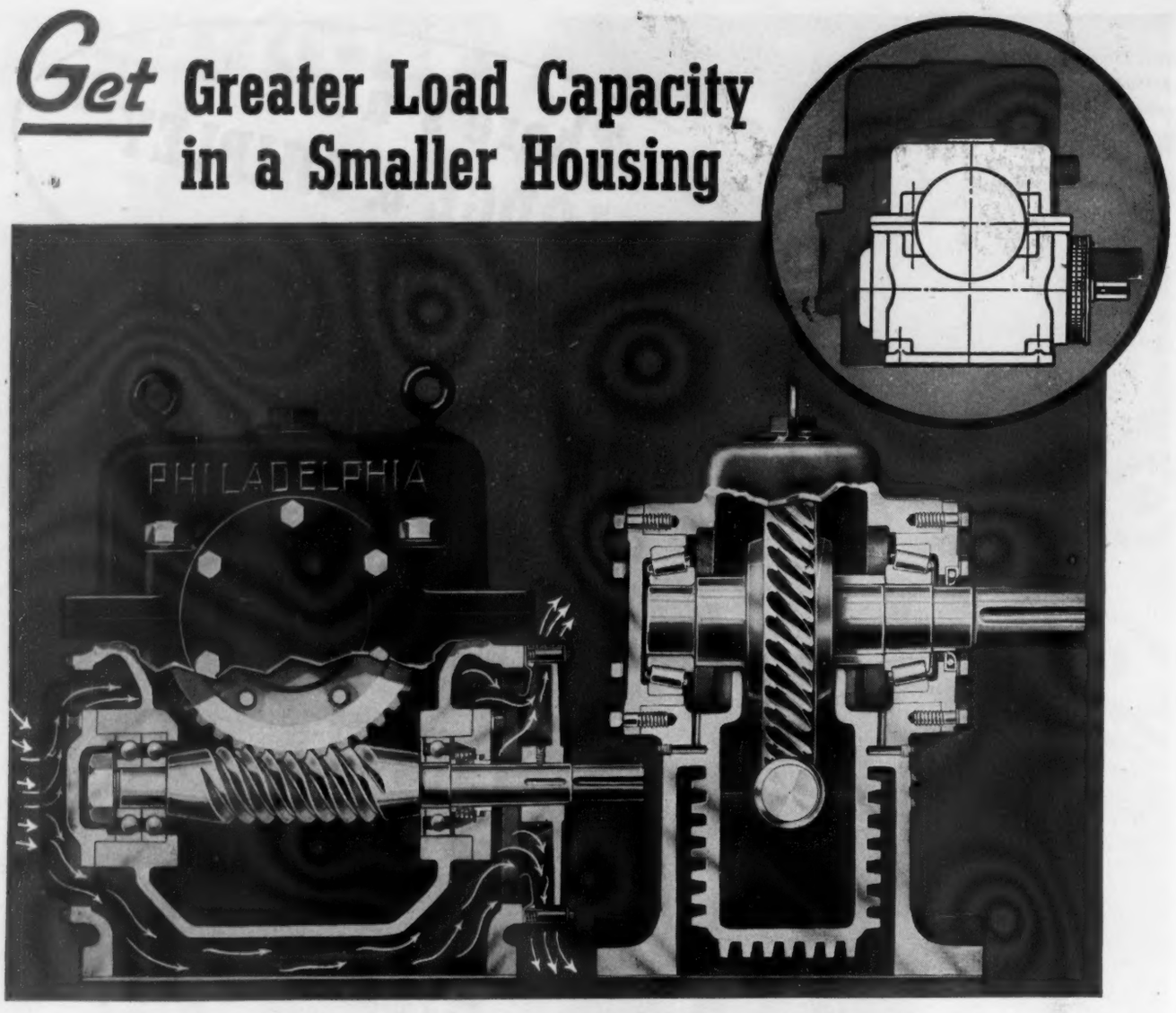
THE LODGE & SHIPLEY MACHINE TOOL CO.

L & S LATHES

CINCINNATI 25, OHIO, U. S. A.

MACHINE TOOL DIVISION 3055 COLERAIN AVE. • SPECIAL PRODUCTS DIVISION 800 EVANS ST.

Get Greater Load Capacity in a Smaller Housing



...with the Philadelphia AIR KOOLED Worm Gear Speed Reducer

At the upper right is shown the comparative sizes of a size 675 Type AT standard unit (in blue) and a size 475 AirKooled unit. Both deliver 20 HP at 1750 RPM. Ratio 4 6/7 to 1.

The cut-away drawings show the double-walled, finned housing and the flow of air around the oil reservoir.

Considerable *space* and *weight* savings have been made possible by the design of Philadelphia AirKooled Worm Gear Reducers as compared with standard heavy duty type worm gear units.

The AirKooled design features a suction fan, mounted on the worm shaft, which draws air through the double-walled, finned housing. This dissipates generated heat, and thereby maintains a higher contact oil film strength and greatly increases the horsepower ratings at worm speeds of 580 and 1750 RPM. For all ratios at 1750 RPM the ratings are approximately doubled, so the AirKooled unit is about two sizes smaller than a standard unit of the same capacity.

Let us tell you what these savings can mean to you.

SEND FOR BULLETIN 250 . . . . *on your Business Letterhead*

Philadelphia GEAR WORKS INCORPORATED

ERIE AVE. AND G ST., PHILADELPHIA 34, PA. NEW YORK • PITTSBURGH • CHICAGO
IN CANADA: WILLIAM & J. G. GREEY LIMITED, TORONTO.

Industrial Gears and Speed Reducers
LimiTorque Valve Controls

WELDING ACCESSORIES

CHIPPING GOGGLES
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WELDING GOGGLES
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WELDING CLEANING TOOLS
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SAFETY CLOTHING
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CARBON PASTE & FLUXES
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WELDING CABLE CONNECTORS
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•
CARBON PLATES
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WELDING CABLE
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WELD SPATTER ELIMINATOR
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ELECTRODE HOLDERS

For the deposition of exceedingly sound, clean weld metal when welding in sharp, narrow grooves of heavy plate thickness, use **CHAMPION Black Devil Electrodes.** The **Black Devil** is recommended for high speed welding in the flat position and for making 45° horizontal fillet welds that are extremely smooth and slightly concave in appearance.

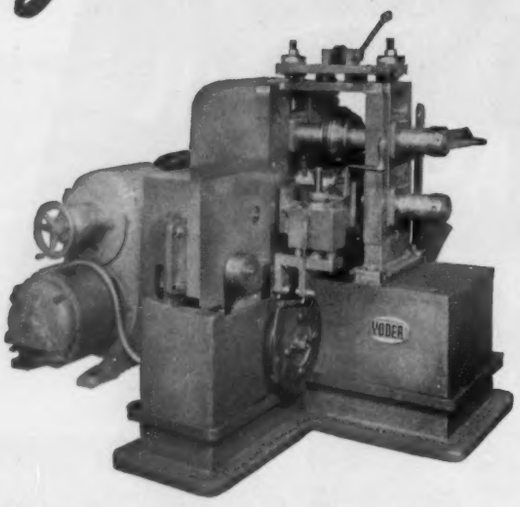
Whatever **your** particular welding problem, there is a **CHAMPION Welding Electrode** which will provide superior welds and increased production. The name of **CHAMPION** guarantees the result.

THE CHAMPION RIVET COMPANY

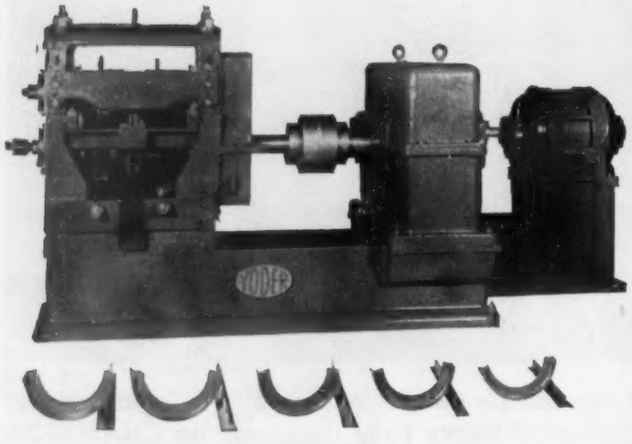
CLEVELAND, OHIO — **EAST CHICAGO, IND.**

Yoder SPECIALIZES

IN MACHINERY FOR "OUT-OF-THE-ORDINARY" PRODUCTION IN METAL



YODER cam-type bending machine for forming wide range of shapes in irregular sweeps of curves. This type of machine has frequently replaced five or more separate operations. Available in three regular sizes.



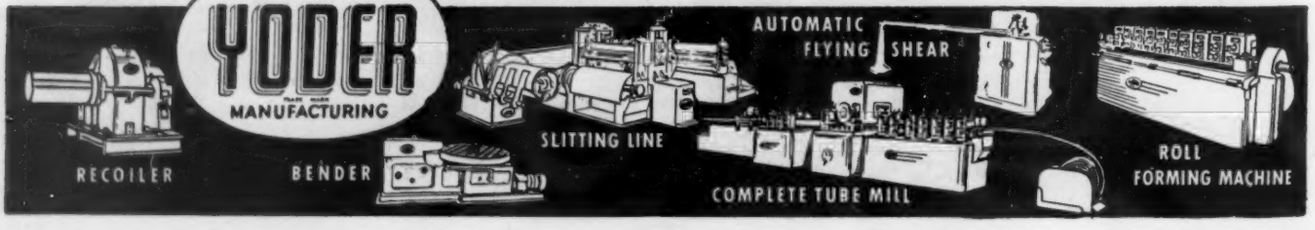
Special YODER machine for producing 1200 to 1400 brake shoes per hour, using standard hot-rolled sections. Other machines form and bend rings all sizes from headlight rims to barrel rings or bicycle wheels.

YODER know-how and engineering skill, generously seasoned with ingenuity, has solved many a tough production problem in the past. Also, many improvements in our customers' products and manufacturing methods have resulted from adaptations of machines from the regular YODER line. Two random examples of special YODER machines are shown at left. Others are shaping washing machine components; refrigerator parts; accessory, appliance, instrument and electrical fixture parts . . . almost anything made from strip, sheet or plate.

A quick way to find out how YODER'S specialty can help you is to send parts, blueprints or sketches . . . even an outline of an idea for development . . . or have a YODER engineer come to you. Meantime, let us send you Bulletin G451 describing YODER machinery.

For engineering consultation or product information write to

THE YODER COMPANY
5502 Walworth Avenue, Cleveland 2, Ohio



AS PROTECTION AGAINST WEAR

Vibration . . . friction . . . wear—that's the story even under normal service conditions. Result? Bolts and screws won't hold tight, assemblies become loose and breakdowns often occur.

How to prevent this? Use a good spring lock washer built to provide positive spring tension as the wear occurs . . . to keep the assemblies tight . . . and prevent breakdowns. That positive Controlled Tension is found in every Diamond G Lock Washer and only in Diamond G's. It assures unfailing spring tension . . . plus thrust washer bearing.

With a Diamond G equipped assembly you can tighten the bolt fully and depend on a safeguard against excessive vibration, shock and wear.

Next time specify Diamond G for safety. For complete details on the new ASA and SAE specification on spring lock washers write for our new, free folder.

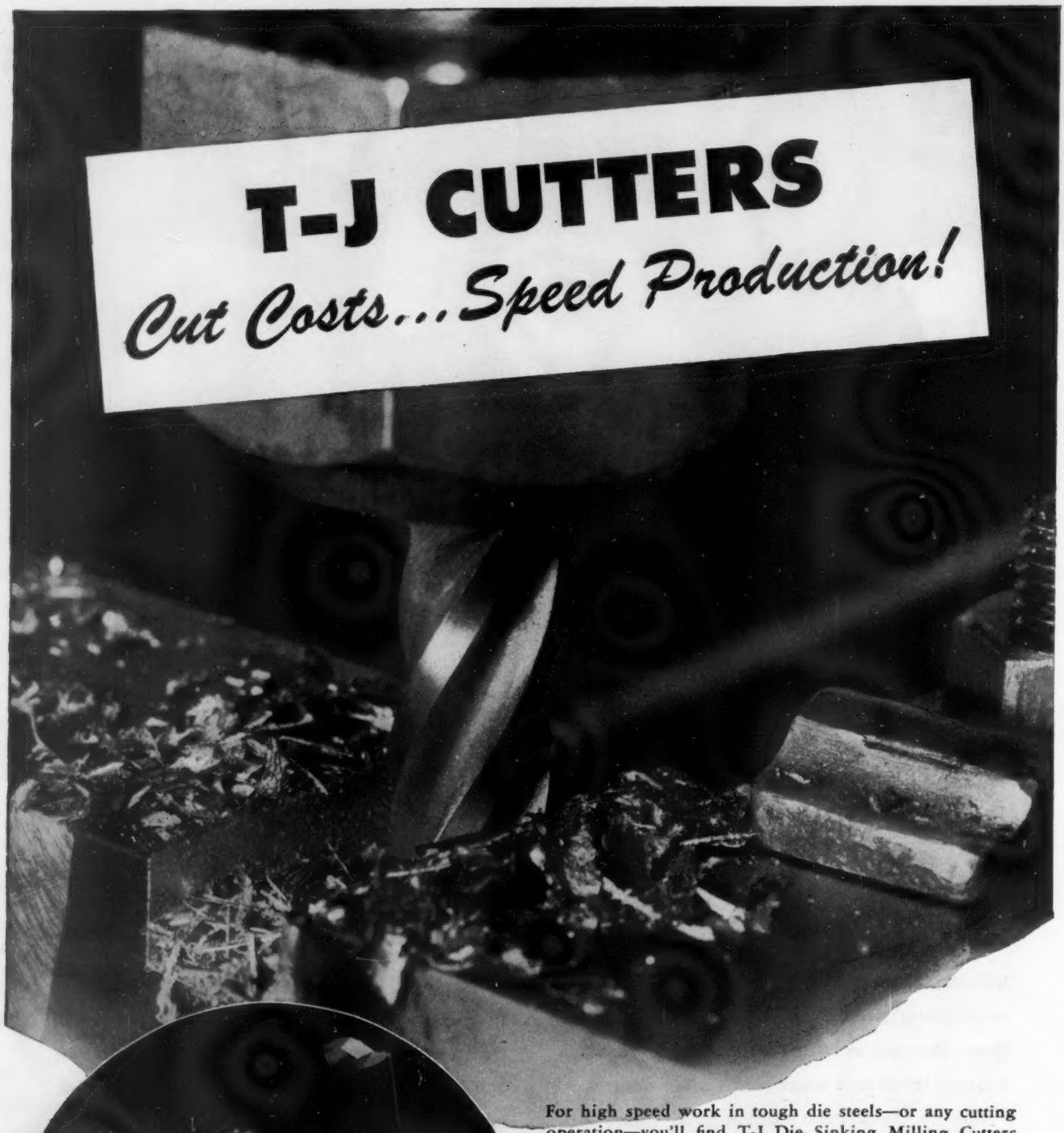
GEORGE K. GARRETT CO., INC.
1421 CHESTNUT STREET, PHILADELPHIA 2, PA.
MANUFACTURERS OF

DIAMOND G PRODUCTS

LOCK WASHERS • • FLAT WASHERS • • STAMPINGS • • SPRINGS • • HOSE CLAMPS • • SNAP AND RETAINER RINGS

T-J CUTTERS

Cut Costs... Speed Production!



For high speed work in tough die steels—or any cutting operation—you'll find T-J Die Sinking Milling Cutters unbeatable for *speed, accuracy* and *cost-cutting efficiency!*

Correctly designed . . . made from a standard, extremely high grade steel . . . properly machined . . . scientifically heat-treated and accurately ground . . . T-J Cutters do a better job with *more work between grinds!* Try T-J for easier cutting, less breakage, and a faster feed rate—with old or new machines! Many styles and sizes. Send for new catalog.

The Tomkins-Johnson Company, 600 Mechanic Street, Jackson, Michigan.

FOR TOUGH JOBS SPECIFY

T-J

TOMKINS-JOHNSON

DIE SINKING MILLING CUTTERS

Design FOR Utility

...WITH REPUBLIC ELECTRUNITE TUBING

In up-to-the-minute functional design, ELECTRUNITE steel tubing stands out as the easiest-to-use structural material available. And when all the inherent structural advantages of tubing can be obtained in a product that lends itself so readily to many different types of paint, lacquer and plated finishes, the designer's job becomes a cinch.

Then, too, ELECTRUNITE tubing is so easily formed, due to its uniform ductility and dimensional accuracy, that the designer is not hampered by any "Can't be done!" from the manufacturer. If you aren't equipped to do the necessary fabricating in your own plant we may be able to handle your requirements ourselves, or refer you to one of the many tube fabricators who can help you work out details of the design you have for a tubular product. Consult your directory or get in touch with us.

If you wish technical data about steel tubing, give us an opportunity to furnish it to you. Write to:

REPUBLIC STEEL CORPORATION
STEEL AND TUBES DIVISION • CLEVELAND 8, OHIO
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OHIO FERRO-ALLOYS CORPORATION a major supplier of FERRO SILICON

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FERRO SILICON 50%, 75%, 85%, 90%

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For almost every Silicon requirement in the Iron and Steel industries there is an Ohio Ferro-Alloys Ferro Silicon to meet the most rigid specifications; high metallurgical standards and the exclusive Ohio Ferro-Alloys metalcast process provide this assurance. Many iron and steel producers always rely on Ohio Ferro-Alloys' prompt supply service exclusively and gain valuable assistance from a "production minded" staff when problems relating to ferro-alloy applications are at hand. A friendly discussion with an Ohio Ferro-Alloy representative may be helpful to you — why not phone or write to arrange a meeting now?

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THREAD IT *FASTER*

WITH AN OSTER

NO. 531-A TOM THUMB THREADING MACHINE

Rotary Die-Head, fully adjustable. Open-type Vise saves time dropping stock into and removing from machine.

No. 422 *"Power Vise Stand"* converts hand tools to power tools for threading, cutting, reaming pipe.

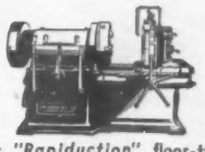
No. 502 *"Pipe Master,"* the lowest priced complete, portable power pipe machine on the market.

No. 562 *"Tom Thumb,"* another Oster portable power pipe machine designed for speed and accuracy.

Use it as the ONE machine for all the work or as an auxiliary to the big Oster Threading Machines. Either way, its production speeds keep threading costs at consistently low levels.

For example, floor to floor time on 1/8" pipe averages 13 seconds; 1 1/4" pipe—23 seconds. Bolt and rod speeds: 3/8"—33 seconds. 1 1/4"—25 seconds. Comparable production speeds on all other sizes within range of machine.

State your needs for threading speeds and somewhere in the Oster line is the right machine for your requirements. Catalogs on request.

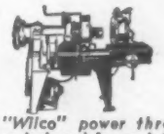


Oster *"Rapiduction"* floor-type, high speed, high production threading machines. Made in three sizes.

No. 572 *"Rapiduction Junior"* . . . floor type power pipe machine equipped with revolving die-head and open type vise.

No. 542 *"Rapiduction Junior"* with revolving die-head and open type vise. Handles wide variety of threading work.

Oster *No. 300 Series* general purpose threading machines with revolving die-head and open type vise. Three sizes.



Oster *"Wilco" power threading machines* designed for maintenance and production threading. Two sizes.

OSTER ***machines make jobs***

THE OSTER MANUFACTURING COMPANY, 2037 EAST 61st ST., CLEVELAND 3, OHIO, U. S. A.

MIDVALOY STAINLESS BARS

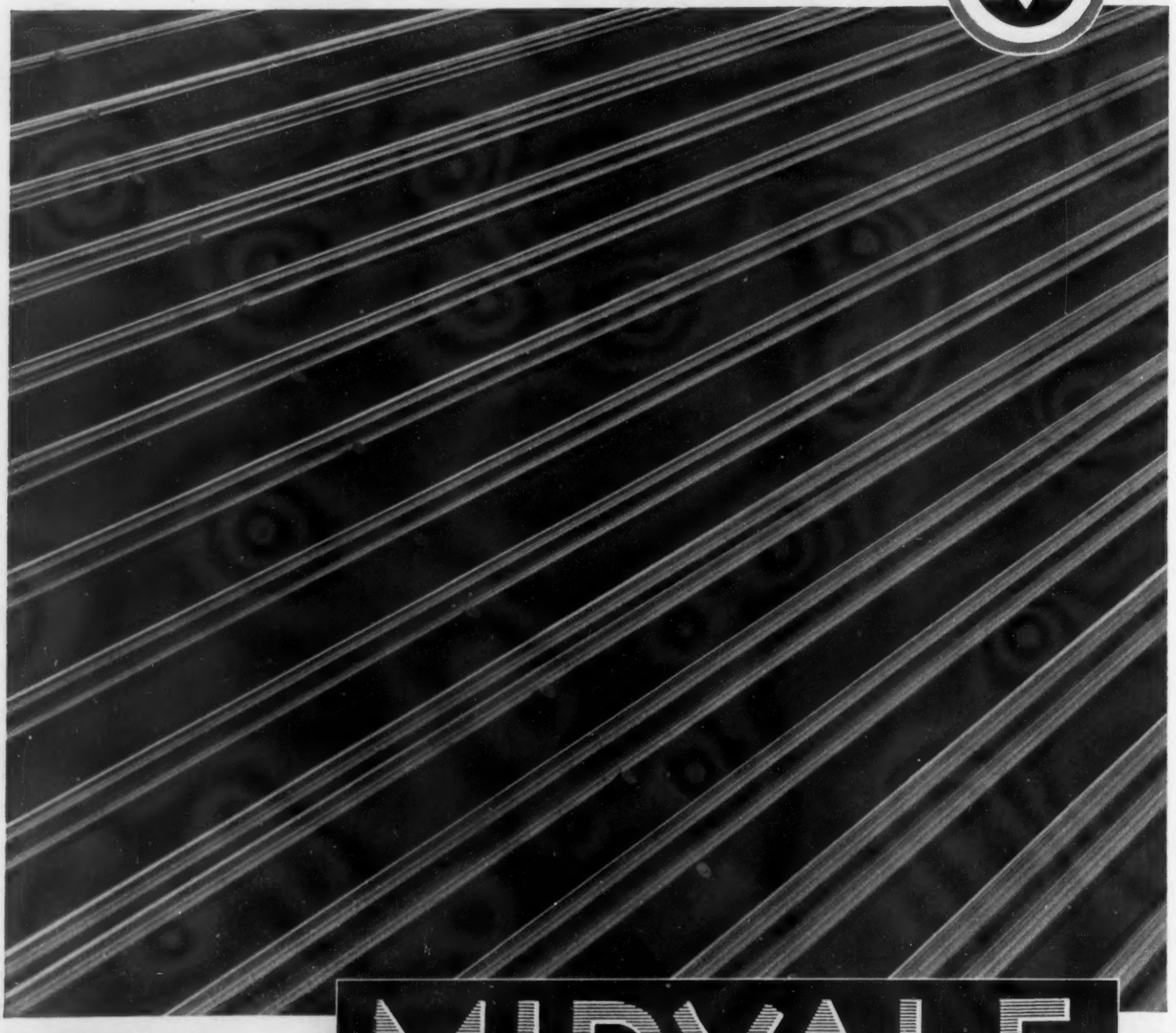
The rapidly expanding market for stainless steel products has called for the production of many types of stainless steel bars.

Midvale's long years of experience in manufacturing fine bar steels has proved to be of inestimable value, particularly when meeting requirements for special types about which little was previously known.

Midvaloy stainless steel bars regularly produced include all the usual types in the three principal groups—Chromium Nickel, Non-Hardenable Straight Chromium and Hardenable Straight Chromium—as well as many special types for special purposes.

THE MIDVALE COMPANY • NICETOWN • PHILADELPHIA

OFFICES: NEW YORK • CHICAGO • PITTSBURGH
WASHINGTON • CLEVELAND • SAN FRANCISCO



One of eight plants to retain original Navy "E"

MIDVALE

Custom Steel Makers to Industry

skilled springmakers . .
AND practical,
experienced engineers,
SPECIALISTS
in spring design
and manufacture
at Accurate

It takes people to make springs. Ours are specialized, highly trained, long-experienced people—well qualified to give you the finest in spring craftsmanship.

Q Our engineers too, are an important reason why you'll like Accurate Spring Service. They're old hands at spring-making . . . they've developed manufacturing systems and procedures that enable us to handle your jobs with the greatest speed and efficiency. These Accurate engineers are at your service on spring design problems. You will benefit from their practical assistance in designing exactly the right spring for your application.

Q Why not try Accurate on your next job.

Send for your copy of the new Accurate Spring Handbook. It's full of data and formulae which you will find useful. No obligation of course.

ACCURATE SPRING MFG. CO.
3823 W. Lake Street **Chicago 24, Illinois**

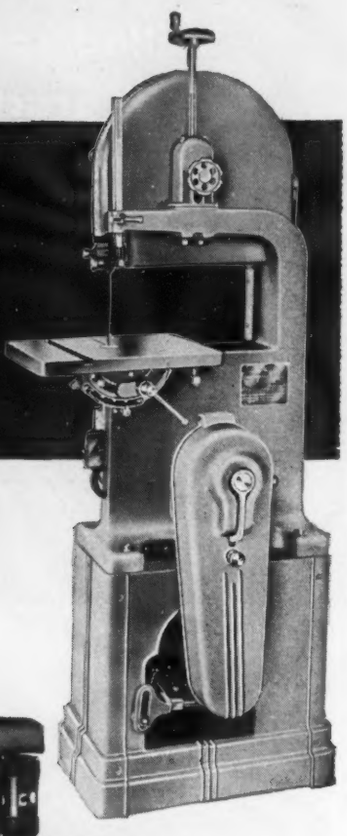
Accurate Springs

SPRINGS • WIREFORMS • STAMPINGS

KEEP YOUR PRODUCTION "LIGHT ON ITS FEET"!

Speed Up Tooling Shifts With

Walker-Turner
MACHINE TOOLS

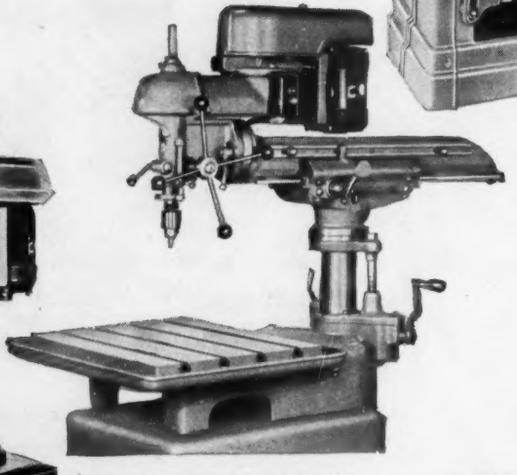


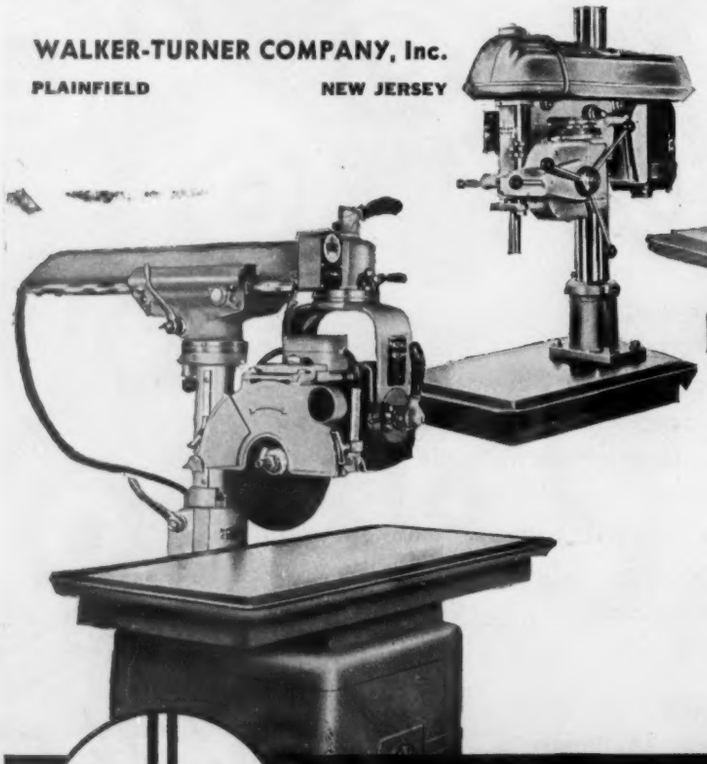
Walker-Turner Light Machine Tools reduce your re-tooling problems to a minimum. Here's why:

(1) Quickly shifted from one operation to another.
(2) Ideal for special tooling set-ups—eliminating need for high-priced special machines of limited usage.
(3) Rugged, safe and simple to operate.
(4) Low in price and in power consumption.

Complete catalog on request.

WALKER-TURNER COMPANY, Inc.
PLAINFIELD **NEW JERSEY**





METAL CUT-OFF MACHINE

Universal head travels 21½" on gliding ram. Patented geared motor gets shaft closer to work permitting deeper cuts than where wheel is mounted on center shaft of conventional motors.

RADIAL DRILL

Drills to center of 62" circle. Head tilts 45° right and left. Built-in ball-bearing jack-shaft gives spindle speeds from 160 to 830 R.P.M. This permits selection of correct cutting speed for each material.

20-INCH DRILL PRESS

Spindle speeds, 260-5200 R.P.M., permit selection of correct speed for each material. Hand or power feed. Floor and bench, single and multi-spindle models.

14" BAND SAW

Back-gearing and cone pulley on this and the 16" model, also available, provides wide range of speeds (70-5300 S.F.M.) cutting all materials from wood to tool steel.

walker-turner
COMPANY, INC.
PLAINFIELD, N.J.
U.S.A.

MACHINE TOOLS

DRILL PRESSES — HAND AND POWER FEED • RADIAL DRILLS
METAL-CUTTING BAND SAWS • POLISHING LATHES • FLEXIBLE SHAFT MACHINES
RADIAL CUT-OFF MACHINES FOR METAL • MOTORS • BELT & DISC SURFACERS

INDEPENDENT INVESTIGATOR FINDS

Sonotone uses Phillips Screws to reduce case breakage 90%

This investigator from James O. Peck Co., industrial research authorities, is visiting a number of representative plants to get authentic FACTS on assembly savings.

GET HIS FACT FILLED REPORTS ... GET THE COMPLETE STORY

Every driver skid eliminated saves $1.35 reclaiming costs!

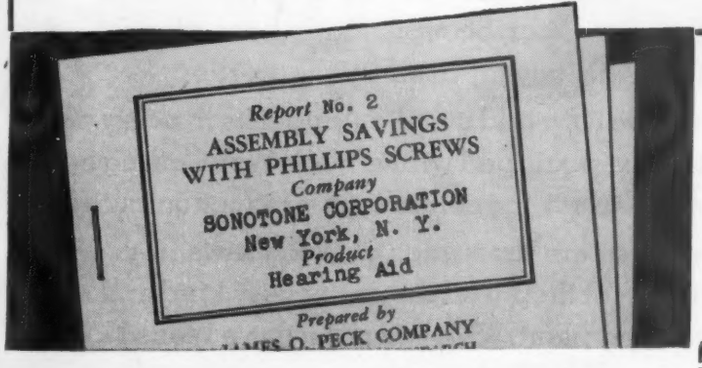
SONOTONE CORPORATION uses Phillips Screws because they lower costs and improve the product . . . the same simple but all-important reason why thousands of other successful manufacturers use them.

TO GET THE FACTS, to determine the actual savings, the investigator studied Sonotone's assembly methods, asked the same questions you would ask. He was told that, with slotted screws, breakage of the fine, hard plastic case of the Sonotone hearing aid would be ten times greater than with Phillips screws. Reclaiming, which involves not only the cost of a new case half, but also the cost of disassembly, reassembly and careful matching up of

case halves, amounted to $1.35 per unit. The burr-free, ornamental Phillips recess is another reason why Sonotone chose Phillips Screws. Read the complete, revealing story in the Sonotone report.

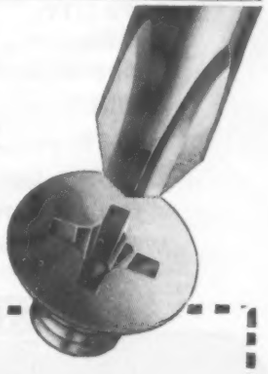
THE ASSEMBLY STUDIES cover all types of products – metal, plastics, wood – show how the many Phillips Screw advantages add up big savings you can make in your assemblies.

THE REPORTS now ready – and more to come – comprise a practical manual of modern assembly methods, never-before-printed information, inside facts you'd pay good money to get, – and it's yours, now, FREE!



PACKED WITH IDEAS FOR SAVINGS IN YOUR ASSEMBLIES!

Whatever you make you'll find how all assemblers licked problems like your own. Get these reports. The coupon will bring those ready now, and the rest as they are issued. Fill it in and mail it – TODAY!



PHILLIPS *Recessed Head* SCREWS

Wood Screws • Machine Screws • Self-tapping Screws • Stove Bolts

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The H. M. Harper Co.
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Parker-Kalon Corp.
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Sterling Bolt Co.
Wolverine Bolt Co.

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c/o Horton-Noyes
2300 Industrial Trust Bldg., Providence, R. I.

Please send me the reports on Assembly Savings with Phillips Screws

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CUTS

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CUTS metal, fibre, plastics and other materials

Specifications

WELLS No. 8

CAPACITY:
Rectangular . . . 8"x16"
(Special Guides) . 5"x24"
ROUNDS: . . 8" Diameter
MOTOR: . . . . ½ H. P.
SPEEDS: Selective 60, 90, 130 feet per minute
WEIGHT: Approximately 750 pounds

• This Wells Metal Cutting Band Saw is indeed a handy tool. It cuts metal, fibre, plastics and other materials. Easy to use. Easy to move from one job to another. Saves time and labor, occupies little floor space . . . A Wells No. 8 will pay for itself in short order.

You can use it for odd metal-cutting jobs in every part of the plant, or, equipped with a Wells Wet-Cutting System, you can use it for continuous production cutting.

Today, there are thousands of Wells saws in use . . . proof enough of their usefulness in every kind and size metal-working plant. Where can *you* use a Wells No. 8?

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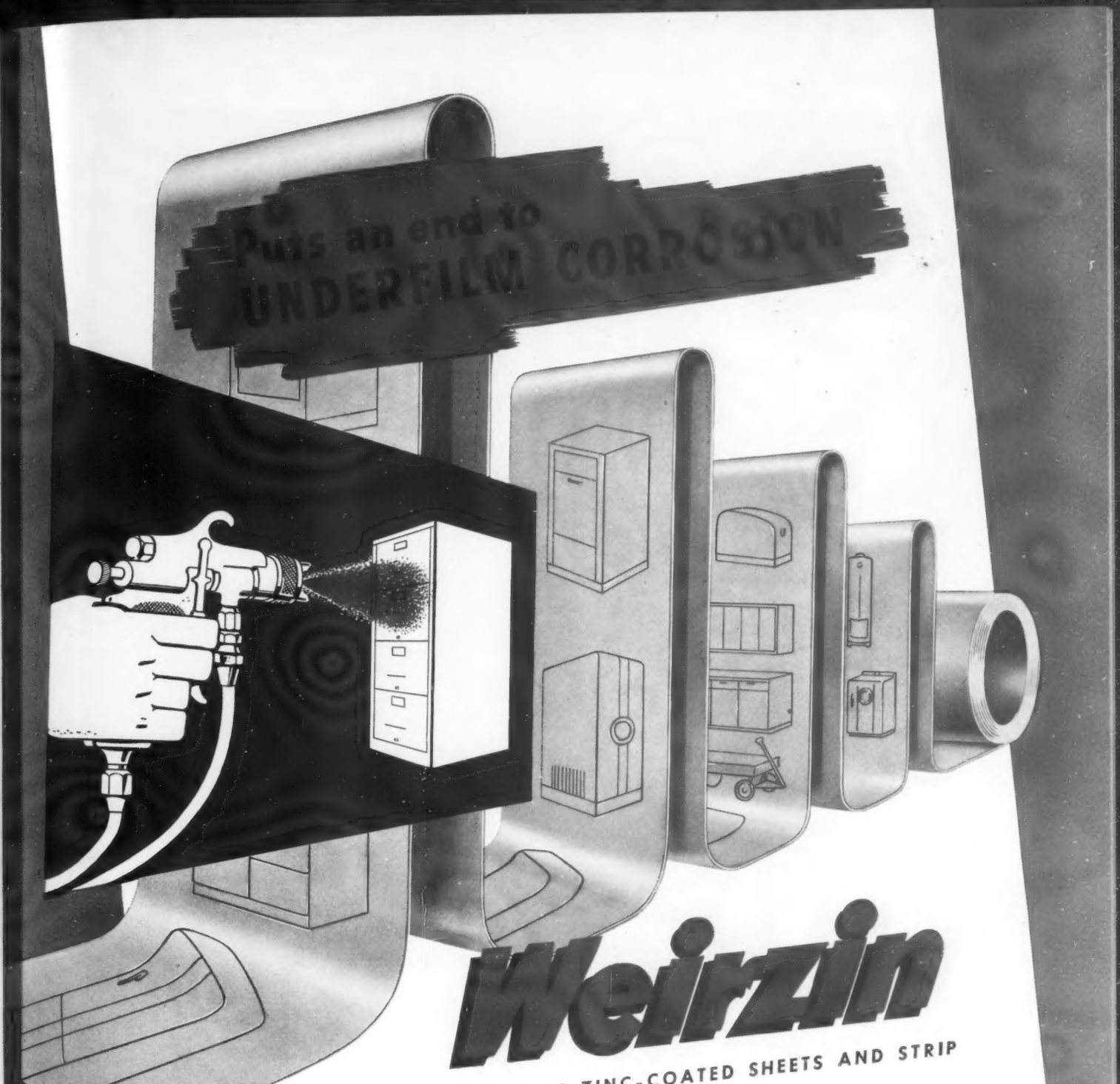
THE SIGN OF SERVICE

Wells

Products by Wells are Practical

METAL CUTTING BAND SAWS

WELLS MANUFACTURING CORPORATION
1515 FILLMORE ST., THREE RIVERS, MICHIGAN



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ELECTROLYTIC ZINC-COATED SHEETS AND STRIP

Under-film corrosion, enemy of lasting surface finishes, is no longer a problem for manufacturers who use Weirzin sheet or strip for their products. The tight, malleable zinc coating affords a perfect "tooth" for spray, dip or roller applications—safeguards permanently against rust or corrosion beneath the surface finish.

Weirzin's double-protection factor—better "tooth" plus corrosion-resistance—is applied to every inch of surface area. Its uniform coating will not flake, peel or powder under extreme forming stresses . . . remains intact under all conditions of temperature and humidity.

Put Weirzin in your production picture, and bring a better product to postwar markets at a substantial saving in manufacturing costs. Elimination of pickling, cleaning and buffing operations, prime coats and inventory loss makes Weirzin the most economical material you can use.

WEIRTON STEEL CO.

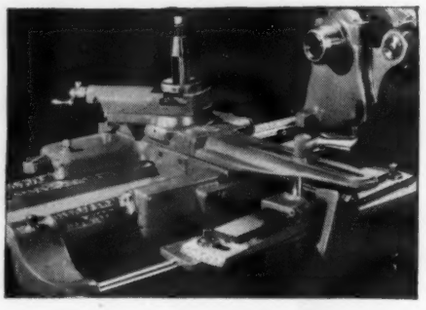
WEIRTON, W. VA. Sales Offices in Principal Cities

Division of **NATIONAL STEEL CORPORATION** Executive Offices, Pittsburgh, Pa.

Designed for TODAY'S Needs!

South Bend Precision Lathes are designed and built to meet the exacting needs of today's industries. Their accuracy and ability to handle a wide variety of operations raise standards of quality in the toolroom, speed tooling, keep costs to a minimum. These same features—plus speed, ease of operation, and dependability—raise quality levels in the manufacturing plant, step up the flow of production, lower costs by reducing the amount of "machine scrap," and, in some instances, by eliminating the need for one or more finishing operations.

Made with 9", 10", 13", 14½", and 16" swings, with collet capacities up to 1", and with bed lengths to 12', there is a South Bend Lathe that will meet your most exacting requirements. Prices range from $110.50 to $1673, less electrical equipment, f.o.b. factory. Write today for complete, illustrated Catalog 100-D which contains detailed specifications.



TELESCOPIC TAPER ATTACHMENT

For 10", 13", 14-1/2", and 16" South Bend Lathes

Write for Catalog 77 which illustrates and describes the complete line of South Bend Lathe attachments and accessories. Mailed without obligation.

SOUTH BEND LATHE WORKS

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LATHE BUILDERS SINCE 1906

DIAMONDS IN A

New and Improved Vitrified Bond

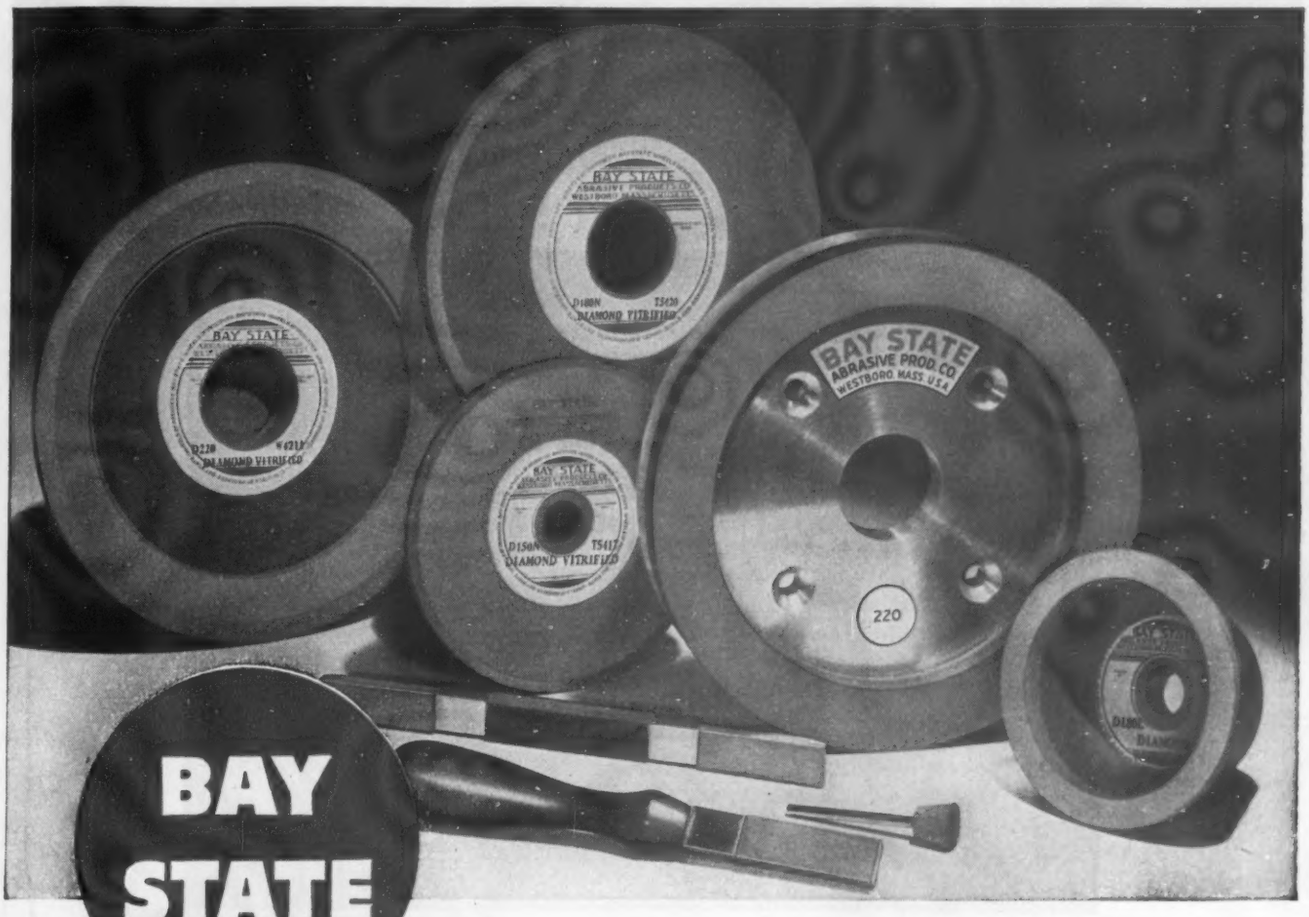
A new vitrified bond designed expressly for diamond abrasive makes a lusty new champion in the grinding of cemented carbide tools and other super-hard substances! The Bay State line of diamond abrasives (resinoid bonded, excellent for many precision and form-grinding operations; and metal bonded, best suited for off-hand grinding jobs) is now supplemented by a new *vitrified* bond.

Considerable research and experiment, together with thorough testing in actual use, have proved the superiority of this Bay State development. Now, the unparalleled abrasive power of diamonds gains the advantages of vitrified bonding — great strength and rigidity, plus faster, cooler cutting action. Results are long life, hair-fine accuracy and lower grinding cost per tool — important additions to the already high economy and efficiency of diamond abrasive grinding.

Typically, Bay State makes available to you this latest achievement, in a wide range of standard shapes and sizes . . . every one of them built to uphold Bay State's record of *top performance consistently duplicated.*

Write for Bulletin #1980, containing full information on Bay State Resinoid, Metal and Vitrified Bonded Diamond Abrasives.

BAY STATE ABRASIVE PRODUCTS CO.
26 Union Street, Westboro, Mass.



BAY STATE

ABRASIVE PRODUCTS

Top Performance Consistently Duplicated

GRINDING WHEELS · HONING AND SUPERFINISHING STONES · PORTABLE SNAGGING WHEELS
MOUNTED WHEELS AND POINTS · CUT-OFF WHEELS · INSERTED-NUT DISCS AND CYLINDERS

Automatic shears.... by HALLDEN

Hallden Automatic Flattening and Cutting Machine for ¼" Thick Steel Strip. Type No. 70

Here's a machine that takes the strip metal from coil, hot bed or trimmer, flattens it, cuts it accurately into pieces of pre-determined length, and piles the pieces neatly upon a conveyor, table or truck. It is a triumph of Hallden engineering.

Consisting of two units, a flattener and a flying shear, it is driven in combination and so timed that during the period of cutting off, the shear moves forward with the exact speed of the metal. The flying shear is a rocker type guillotine design, constructed of a special alloy welded steel. Shear knives are standard type. Each blade has four cutting edges; top and bottom blades are interchangeable, and both blades always move in a mutual plane.

The flattener consists of a 10-roll flattener with two pairs of feed rolls, each roll driven through a coupling. Flattening rolls are constructed of an alloy chrome steel, hardened and ground to a sclero-scope of 90. All rolls are easily removed for grinding.

The machine is designed to cut the metal lengths to an accuracy of 1 64 of an inch. Heavy and rugged, with a low center of gravity, it stands up under continuous service without any attention other than oiling. Simple, rugged and entirely automatic; it is very compact and requires little space.

THE HALLDEN MACHINE CO.

THOMASTON, CONNECTICUT

SALES REPRESENTATIVES:
THE WEAN ENGINEERING COMPANY, INC., WARREN, OHIO.
W. H. A. ROBERTSON & CO., LTD., BEDFORD, ENGLAND.

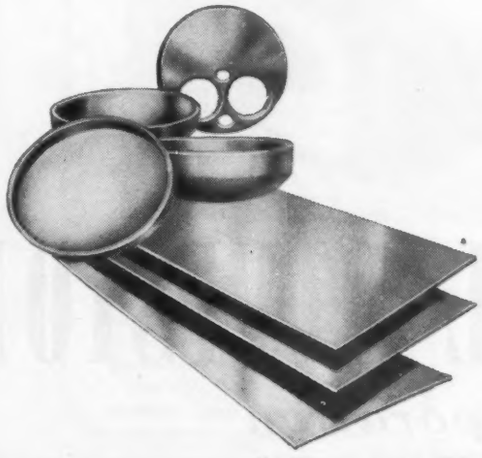
UNIFORMITY

WORTH

You know that Worth Steel Plates and Flanged and Dished Heads are of uniform weight and thickness, of uniform quality.

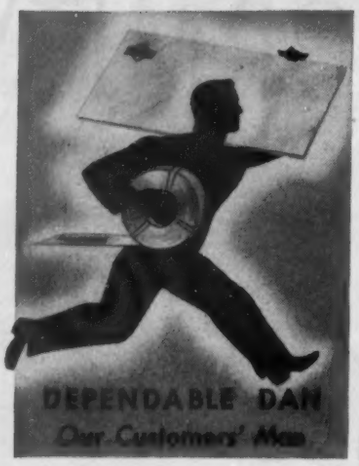
Why? Because of *Worth control of every process from the first alloying to the final shearing and inspections.* The rigid pre-testing of the metals; the careful watch over each step in their making; the accurate, scientific testing by modern, accurate machines; the final inspection by men of long experience, before being marked "O. K.", pronounced free from flaws and absolutely uniform . . . ready to do the jobs for which they were ordered. *Complete, unified control* is the reason for the *uniform quality* of Worth Steel Plates and Heads.

Steel Plates up to 150″ wide; Flanged and Dished Heads from 9½″ to 216″ O.D.; in thickness from 3/16″ to 4″.



STEEL PLATES; FLANGED AND DISHED HEADS

WORTH STEEL COMPANY · Claymont, Delaware



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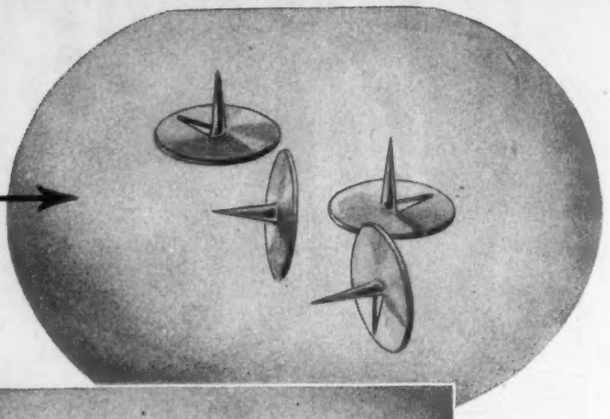
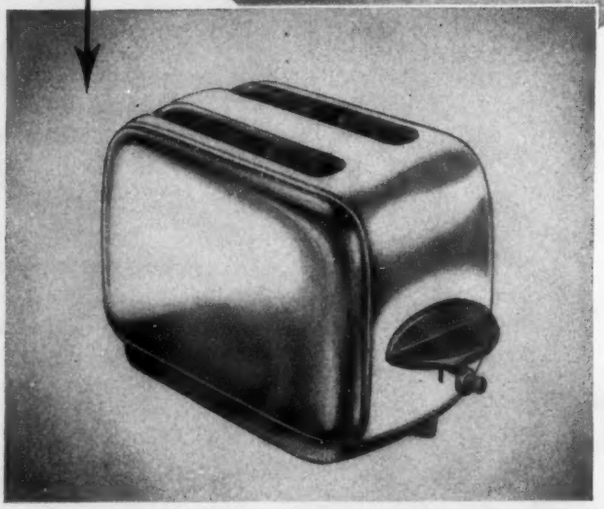
JOB-FITTED STEEL

The Invisible Mark of Quality in Your Product . . .

FROM *Tacks* **TO** *Toasters*





. . . JOB-FITTED TO YOUR PRODUCT

When Reliance Job-Fitted Steel goes into your product, it gives up its own identity but in doing so, it imparts strength, beauty, serviceability and endurance. It makes for speedy, smooth production at low cost.

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Detroit Steel Corporation

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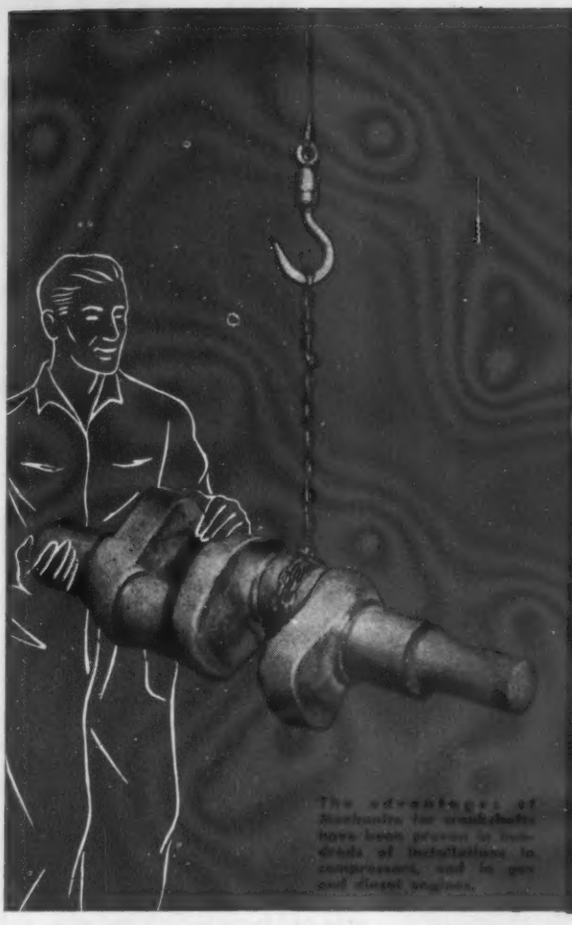
SALES OFFICES: GRAND RAPIDS*, INDIANAPOLIS*, NEW HAVEN, PHILADELPHIA, ST. LOUIS, TOLEDO*
RELIANCE STEEL CORP. OF CANADA, WINDSOR, TORONTO

ALUMINUM SHEETS and STRIPS—available through locations marked*



COMPLETE FACILITIES FOR PRODUCING MEEHANITE CASTINGS IN SIZES UP TO 70 TONS

FACILITIES

- Two foundries capable of making castings in sizes up to 70 tons
- 110,000 square feet of foundry floor space
- Six cupolas
- One six-ton electric furnace
- Modern molding equipment
- Cement molding by the Randupson process
- Dry sand and green sand molding
- Sand reclaiming and conditioning unit
- Large stress relieving and annealing furnaces
- Metallurgical laboratories
- Patternmaking
- Engineering
- Flame hardening and heat treating
- Machine work of all kinds

THE superior physical characteristics of Meehanite castings give them a versatility in application which enables the designer to meet many of the problems of modern machine construction.

Meehanite bridges the gap between iron and steel, and has many of the desirable characteristics of both. Its physical properties of high tensile, impact, torsional and shear strengths; uniform grain structure and freedom from spongy areas; vibration dampening qualities; wear, heat and corrosion resistance; controllable hardness and ready machinability make it ideally suited to a wide variety of applications. Close control of melting practice, molding methods, and general foundry procedure assures sound, quality castings produced to predetermined specifications.

Our two foundries have complete facilities for making Meehanite castings in sizes up to 70 tons. While a large portion of our foundry capacity is kept busy making castings for our own machinery, we are still able to handle a considerable volume of outside work. F-B engineers and metallurgists are also available to assist with your casting problems.

If you are not already familiar with the many advantages of Meehanite, write for descriptive information.

FARREL-BIRMINGHAM COMPANY, INC., ANSONIA, CONN.

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Sales Offices: Ansonia, Buffalo, New York, Pittsburgh, Akron, Los Angeles, Tulsa, Houston, Charlotte

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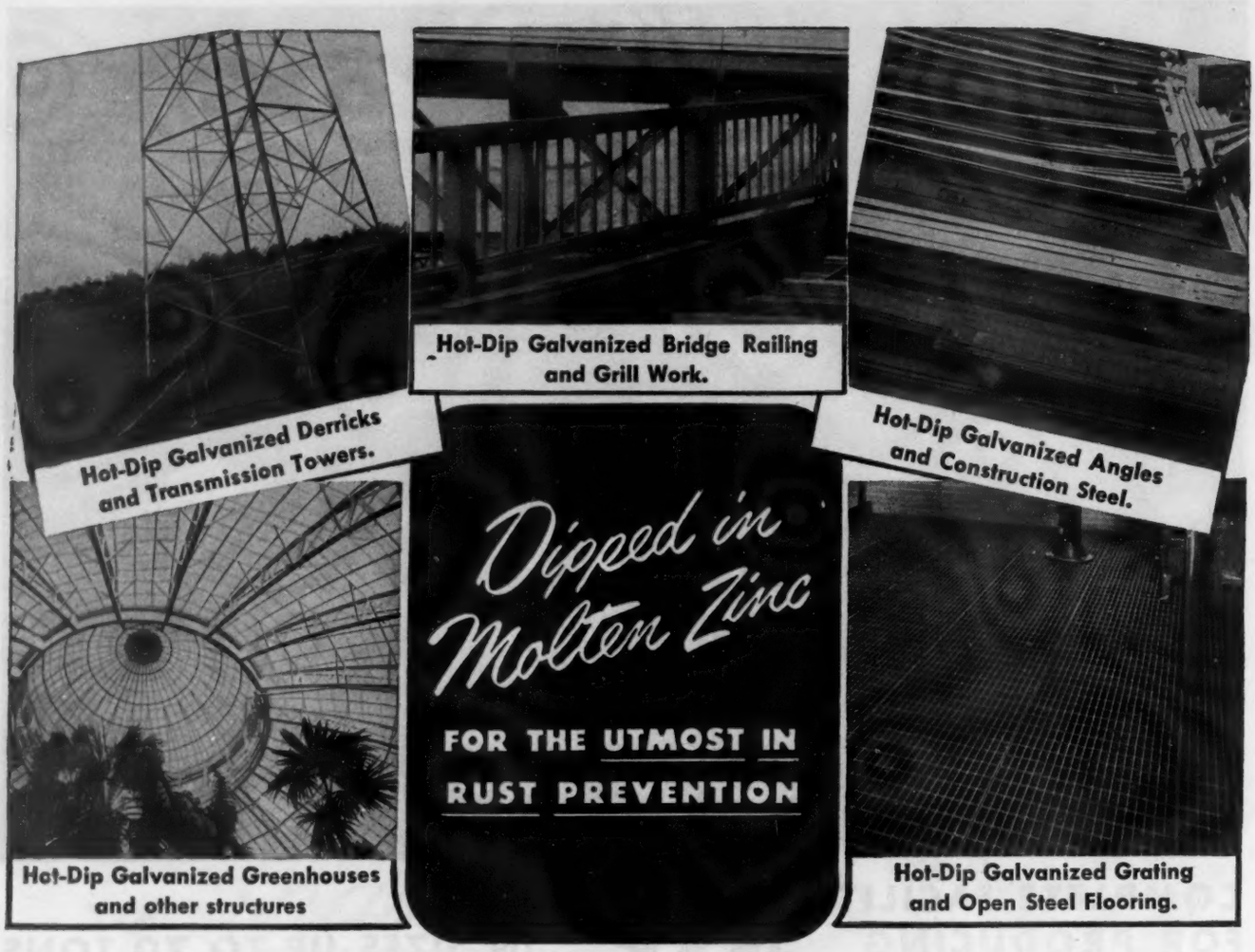
Farrel-Birmingham


Hot-Dip Galvanized Derricks and Transmission Towers.
Hot-Dip Galvanized Bridge Railing and Grill Work.
Hot-Dip Galvanized Angles and Construction Steel.
Dipped in Molten Zinc
FOR THE UTMOST IN RUST PREVENTION
Hot-Dip Galvanized Greenhouses and other structures
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Hot-Dip Galvanized for Longer Life and Longer Uninterrupted Service

Time—unrelenting proving ground for quality—firmly establishes that there is no satisfactory substitute for molten zinc as a rust and corrosive preventive. Hundreds of thousands of actual case histories provide evidence that iron and steel, exposed to the ravages of rust, will last far beyond normal expectancy, render longer life and greater uninterrupted service, and save expensive replacement and maintenance costs when hot-dip galvanized by the American Hot Dip Galvanizers' Methods.

The members of this Association have established, and are pledged to follow consistently the highest standards in the Hot-Dip Galvanizing process.

The services and facilities of this Association are at your disposal. There is a member of this organization located near who will gladly discuss with you any galvanizing problems.

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For any specific information write direct to: American Hot Dip Galvanizers Association, Inc., First National Bank Building, Pittsburgh (22), Pennsylvania.

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GALVANIZED PRODUCTS
PROTECTED BY GENUINE
HOT-DIP GALVANIZING
AMERICAN HOT-DIP GALVANIZERS ASSOCIATION INC.

For the best Zinc Coating use **hot-dip GALVANIZING**

How do induction and dielectric heating work?

What are their advantages and limitations?

Where can you use them?

How do r. f. generators compare with motor-generator and spark gap units?

Now you can get the facts with this new book

The answers are all here in this new fact-packed book by Westinghouse . . . including full-color illustrations and 14 case histories of induction and dielectric heating . . . brazing, annealing, hardening, soldering, plastic molding, rubber curing, plywood bonding. Write today for your copy on your business letterhead, please. Ask for B-3620. Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Penna.

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Westinghouse

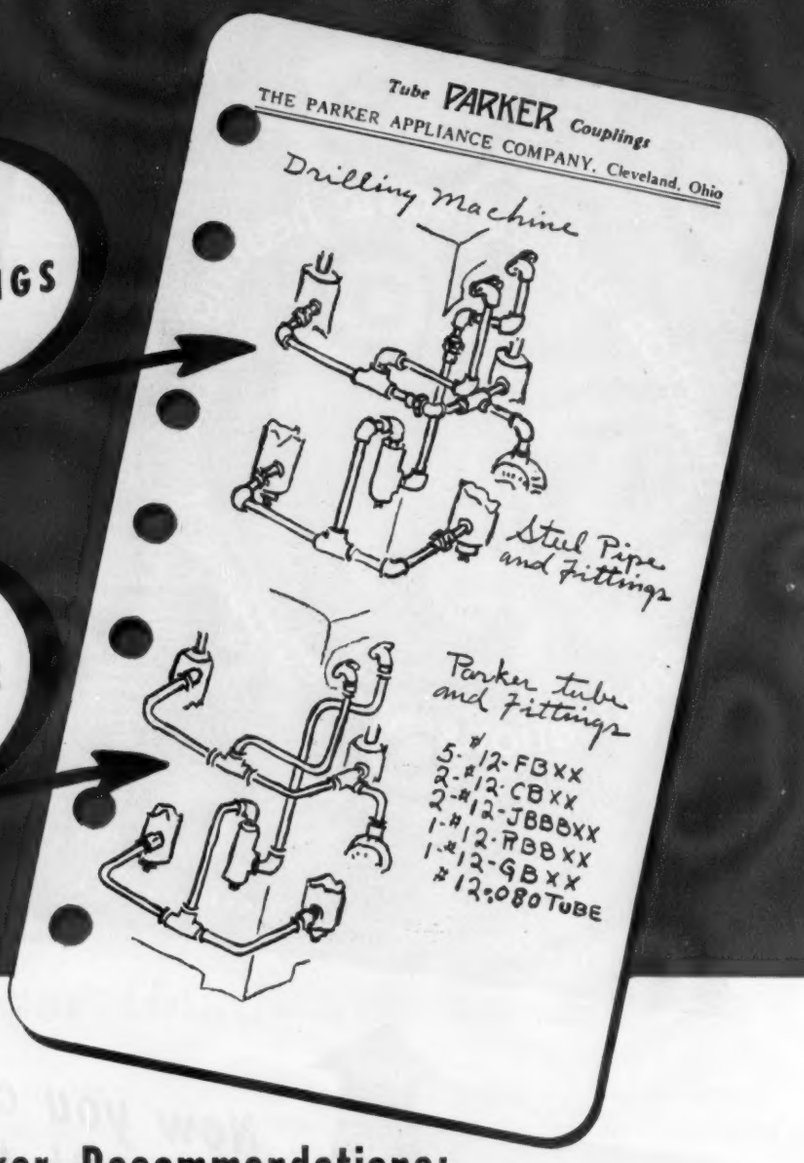
PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

Electronics at Work

PROOF FROM A PARKER ENGINEER'S NOTEBOOK

22 PIPE FITTINGS OLD METHOD

11 PARKER TUBE COUPLINGS RECOMMENDED PARKER METHOD



Advantages of Parker Recommendations:

- Streamlined flow, free from obstructions. No pockets to cause turbulence. Less pressure drop; capacity and pressure requirements reduced.
- Fewer joints and connections — to reduce leakage, even under high pressure vibration, shock, fluid hammer, surge or accidental abuse.
- Compact, spacesaving, neat and simplified installation, especially in tight places — yet all parts are accessible for quick, easy installation and service.

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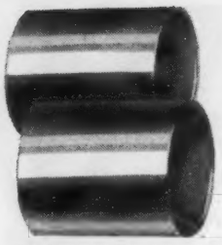
We've engineered Fluid Power installations for many people — to bring them these advantages, under a wide range of exacting conditions. May we do the same for you? Let's talk it over.

THE PARKER APPLIANCE CO.

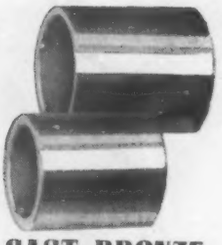
CLEVELAND • LOS ANGELES

FLUID POWER PRODUCTS FOR ALL INDUSTRY



SHEET BRONZE
Plain or graphited

There is ONE RIGHT BEARING *for each* Application



CAST BRONZE
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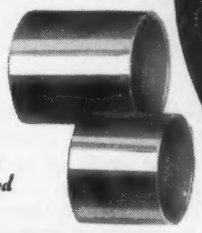

BRONZE ON STEEL
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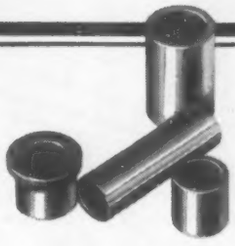
BRONZE and BABBITT

Johnson Bronze *helps* Manufacturers *make the* RIGHT *choice*

STEEL and BABBITT

One easy way to improve the performance of any motive unit is to check up on the bearings. Determine if they are the right type . . . correct in design . . . properly installed. See if they reduce friction to the very minimum . . . eliminate vibration . . . perform quietly for the longest period of time.

The easiest way to determine this is to call in a Johnson Bronze Engineer. Permit him to review your applications . . . to study the operating conditions. As we manufacture *all* types of Sleeve Bearings, we base our recommendations on facts . . . free from prejudice . . . backed by more than forty years exclusive bearing experience. You will find a Johnson Engineer as near as your telephone. Why not get together TODAY?



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Self-Lubricating

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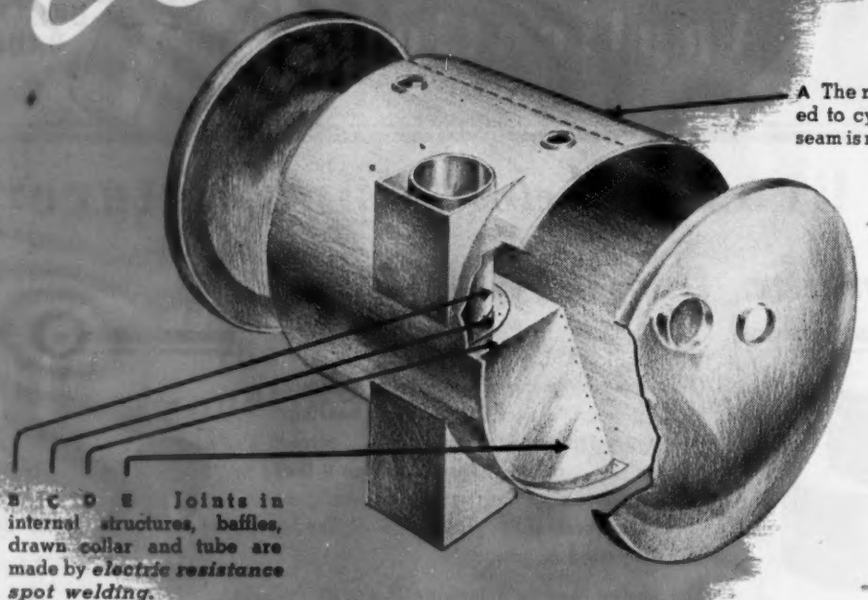
SPEAKING OF MAGNESIUM'S

Weldability



A The magnesium sheet is rolled to cylindrical form and the seam is made by ***torch welding.***

B C D E Joints in internal structures, baffles, drawn collar and tube are made by ***electric resistance spot welding.***

A TYPICAL AIRPLANE OIL TANK MADE OF MAZLO MAGNESIUM—Several joints (not shown) are made by ***helium arc welding.***

In magnesium, designers and production men have a wide selection of joining methods available to them. Spot welding is easily accomplished on standard aluminum welders. Torch welding has been done on a production basis for many years, with best results obtained by using oxy-acetylene gas and AMC-4 welding flux.

The development of helium arc welding for magnesium has greatly increased the designers' latitude with built-up sheet structures. This process, by eliminating the need for flux, permits the use of fillet, lap, edge and butt welds. Also, it cuts to a minimum the distortion and cracking frequently experienced in welded assemblies.

American Magnesium will gladly share its "welding" know-how gained through more than twenty-five years' experience in working with magnesium. For this assistance write:

Aluminum Company of America, Sales Agent for Mazlo Magnesium Products, 1721 Gulf Building, Pittsburgh 19, Pennsylvania.

MAGNESIUM MAZLO PRODUCTS

AMERICAN MAGNESIUM CORPORATION

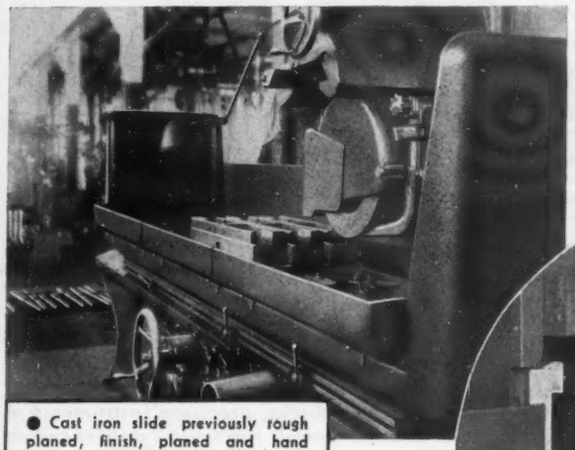
SUBSIDIARY OF ALUMINUM COMPANY OF AMERICA

MATTISON GRINDER
Cuts time up to 75%
ON JOBS PREVIOUSLY HAND SCRAPED

Examples: Time on pump case reduced from 40 hours to 4 hours . . . . . Time cut from 12 hours to 3½ hours on slide castings . . . . . Yearly saving on Housings — 22% the cost of machine, etc.

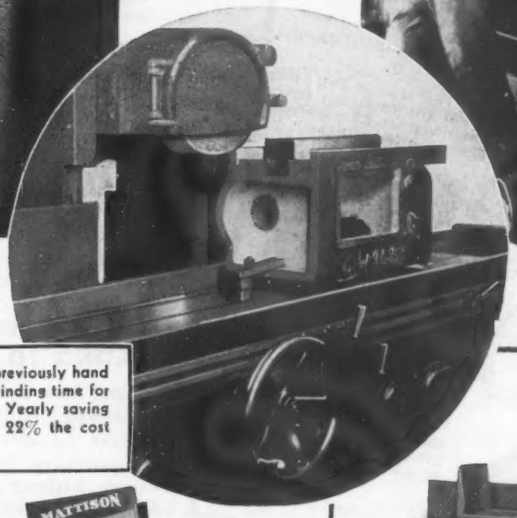
When added together, time savings like this make a big difference in manufacturing cost. To see what Mattison High-Powered, Precision Surface Grinders can do on your work, send us blue prints for production estimates.

● High Pressure pump case previously finished, planed and hand scraped in from 40 to 48 hours — Now the Mattison Grinder has made these operations unnecessary, reduced time to 4 hours and case comes through with a fine finish and accurate to within .0003".



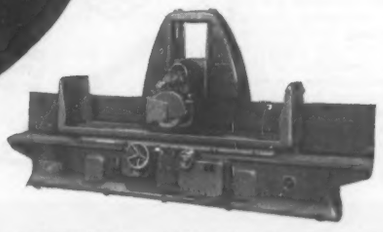
● Cast iron slide previously rough planed, finish, planed and hand scraped — NOW GROUND on Mattison Grinder (6 pieces per set-up) at an 80% savings in time. Finish planing and scraping operations eliminated.

● Cast iron frame previously hand scraped, NOW GROUND top and bottom of casting, shoulder and inside surfaces. 75% time saving.



● Cast iron Housing previously hand scraped in 8 hours. Grinding time for housing is 2.5 hours. Yearly saving on this job alone was 22% the cost of machine.

Write for Free Set-up Book containing further examples, showing how others have reduced time and cut costs with Mattison Grinders.



Mattison High Powered Precision Surface Grinder. Table Sizes: 12" to 36" wide, 36" to 192" long.

MATTISON MACHINE WORKS

ROCKFORD · ILLINOIS

AVERAGE INCREASE IN TOOL LIFE 400%

after Cold Treating in a *Deepfreeze*

Industrial Chilling Machine

Low Cost Chilling Operation Results in Higher Quality Production Tools to Accommodate Stepped-up Production Schedules

Here is what sub-zero temperatures are doing for one of the nation's foremost heat treating organizations. Records maintained since the installation of Deepfreeze Industrial Chilling Machines show that the cold treatment of all types of high speed cutting tools has resulted in an increase in tool life of from 20% to 1,000% with the average being in the vicinity of 400%.

INEXPENSIVE COLD TREATING PROCEDURES BRING OUTSTANDING RESULTS

Results like those listed above are attained by following simple, low cost cold treating procedures. Typical of these is the following:

Preheat 1400-1550° F., depending on analysis. (Double preheating is recommended, using 700-1000° F. first). Heat to hardening temperatures, depending on analysis. (2100°-2400° F.)

Quench in oil, lead, salt, or air.

Remove from quenching medium, at approximately 200° F., and transfer to tempering temperature.

Temper 2-4 hours to hardness specification. (1000° F. minimum). Allow tool to cool to 150° F.

Cold treat to −120° F., in Deepfreeze Chilling Machine for 3-6 hours, depending on cross-section. Allow part to return to room temperature normally. Repeat tempering cycle, using 25° F. lower temperature for 2-4 hours.

COLD TREATING HAS MANY INDUSTRIAL APPLICATIONS

The utility of sub-zero temperatures is not limited to the treatment of high speed cutting tools. It is used with equal efficiency to increase both the hardness and structural uniformity of any metal part; to speedily eliminate growth and distortion in gauges, gauge blocks, precision instruments of all kinds, etc., to contract metal parts for rapid shrink-fit assembly; for the purpose of testing and to perform numerous additional operations.

LEARN THE RESULTS OF APPLYING COLD TREATING TO YOUR PRODUCTION

Find out how cold treating can be put to work in your plant; how it will enable you to attain greater production economies, conserve valuable time and noticeably improve the quality of your products. You can determine the exact results of cold treating without cost by contacting Deepfreeze Engineering Service. Our staff of industrial refrigerating experts will make a complete survey of your production setup and inform you of the specific results you can expect.

A Complete Engineering Handbook on INDUSTRIAL COLD TREATING

This 42-page Deepfreeze handbook contains all of the data you need to put cold treating successfully to work in your plant. It includes a number of the better procedures, actual results attained by following them, a list of Deepfreeze users and numerous other extremely useful facts. Write today for your free copy.

GET RESULTS LIKE THESE BY COLD TREATING METAL CUTTING TOOLS

From 50 to 100 Pieces per Sharpening

100% Increase in Hob Life after Cold Treatment in a Deepfreeze

From 100 to 400 Holes per Grind

400% Increase in Tap Life; Finish Improved on Parts Machined after Cold Treatment in a Deepfreeze

From 70 to 700 Holes per Grind

1000% Increase in Drill Life after Cold Treatment in a Deepfreeze

From 1500 to 4500 Pieces per Grind

300% Increase in Cutter Life after Cold Treatment in a Deepfreeze

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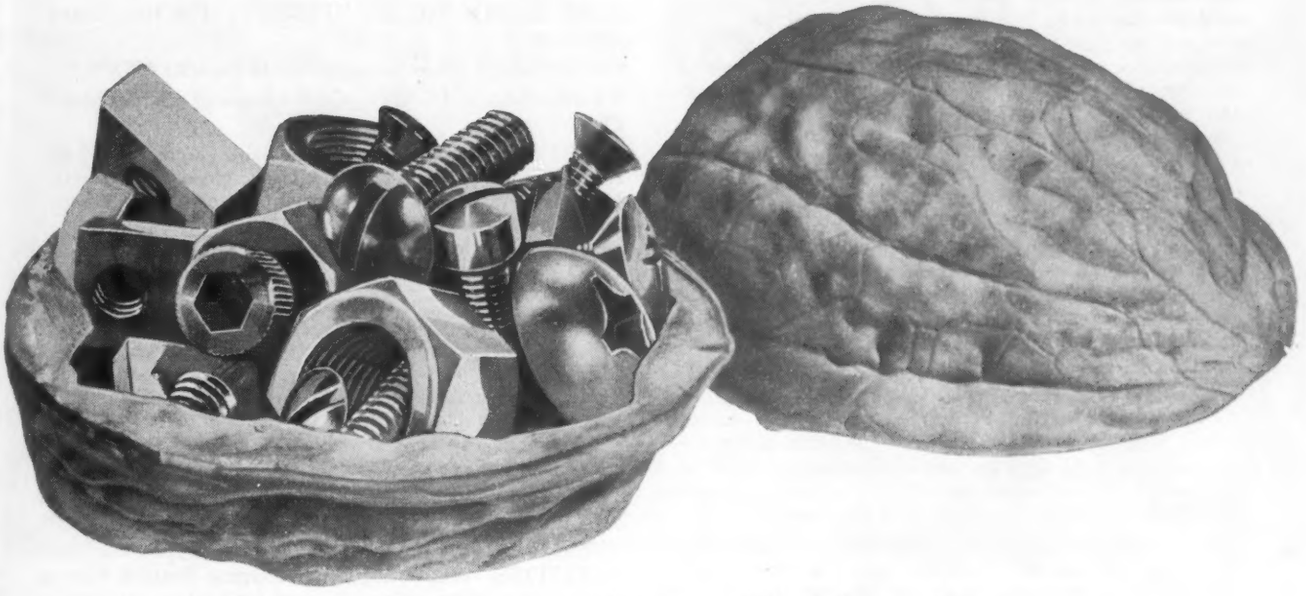

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Proposals shall be delivered no later than Monday, April 1, 1946 to the office of the President, War Assets Corporation, 811 Vermont Avenue, N.W., Washington 25, D.C.

Proposals to purchase may be predicated upon all cash or credit terms. Such terms may include a reasonable down payment, waiver of interest up to the first two years, and amortization to begin the third year, with final maturity not more than eighteen years from date of purchase.

Proposals to lease, if requiring additional expenditures by the Government, must provide for firm minimum rentals which will amortize such expenditures, with interest, over a reasonable period less than the term of the lease. Proposals to lease may include options to purchase upon reasonable terms at any time prior to two years preceding the effective date of termination of the lease.

A brochure on the plant, a detailed floor plan of the blooming and bar mill building, and a guide for use in preparation of proposals may be obtained upon request from the office of the President, War Assets Corporation, 811 Vermont Avenue, N. W., Washington 25, D. C. Arrangements for an inspection of the plant or for a conference with War Assets Corporation in connection with a prospective proposal may also be made through the office of the President of the War Assets Corporation.

All proposals will be considered by the War Assets Corporation with due regard to the applicable objectives of the Surplus Property Act of 1944 and the policies laid down in the Report to Congress of October 8, 1945 of the Surplus Property Administration on Disposal of Government Iron and Steel Plants and Facilities.

War Assets Corporation reserves the right to reject any or all proposals received for the purchase or lease of the above steel plant.

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LOCATION: 114th Street and Burley Avenue, South Chicago, Ill.

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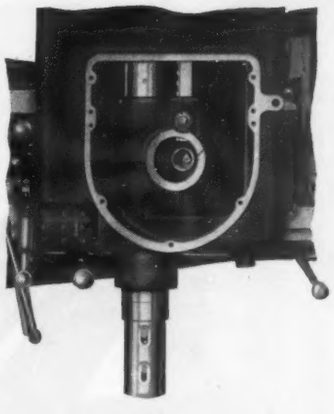

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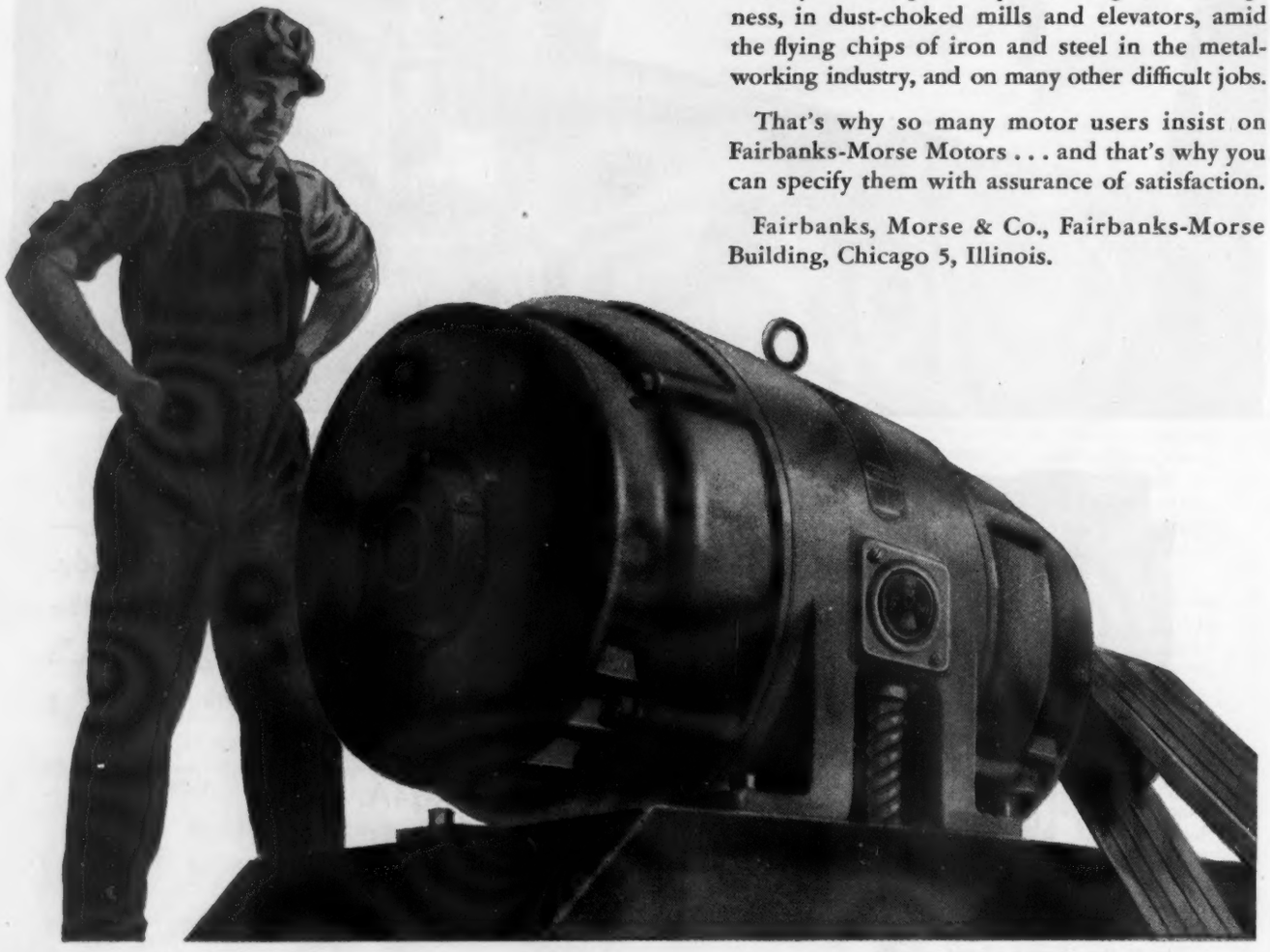

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STEEL

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As the EDITOR VIEWS the NEWS

For Better Public Relations

Within the intimate family circle of American industry there should be more serious attention given to the effect upon public opinion of the statements made by industry's spokesmen.

Recently the National Association of Manufacturers ran full-page ads in newspapers advocating the abandonment of price controls on manufactured articles. Doubtless many members of NAM support this proposal but its timing and the manner of its appearance gave Economic Stabilizer Chester Bowles an opportunity to hit front page headlines with a blast against NAM that gave the reading public the idea that all industry is against price control.

This is unfortunate. Mr. Bowles claims, and we believe him, that a survey he made shows a majority of industrialists favor price controls. A study made by this publication last November showed that of 3600 companies in the metal-working industries—widely diversified as to size, product and geographical distribution—55.4 per cent favored a continuance of price control until supply and demand are in better balance.

It should be pointed out that in Mr. Bowles' survey and in ours, there is no evidence that industrialists are in favor of the kind of price control that has been administered since V-J Day. These studies show clearly that those industrialists who favor price control favor it in principle only and as a necessary temporary brake against inflation. As a matter of fact, returns from those who favored a continuance of price control in our survey were accompanied by strong protests against injustices perpetrated under the Bowles brand of control.

The point is that inasmuch as nobody has yet demonstrated that a marked majority of industrialists want price controls abandoned immediately, the wisdom of NAM's policy in coming out flatly and emphatically for such abandonment at a time when Congress is considering extension of OPA powers is subject to question. One wonders whether those responsible considered fully its effect upon public opinion.

Paul Hoffman's Committee for Economic Development has just issued a research report "Jobs and Markets" which advocates that a liberalized, streamlined version of price control be continued until June 30, 1947. This program probably comes closer to reflecting the considered judgment of industry than does NAM's proposal and it is more likely to put industry in a favorable light in the eyes of the public and of Congress.

All of us in industry have much to learn about public relations. We are far behind politicians, brain trusters, union leaders and left wingers in this respect.

STEEL
March 4, 1946

SLUGGISH WASHINGTON: In the January report of the Civilian Production Administration, John D. Small points out that because of large-scale work stoppages industrial production has dropped to the lowest levels since the early months of 1941. February production, of course, will show a further decline.

The report is illuminating in that it hints in a small way at the production goals that might have been achieved if the strikes had not occurred. For instance, in the case of passenger automobile tires, where the effect of work stoppages was not reflected to any great extent, production in January exceeded 4,800,000 tires compared with 3,900,000 in December and 3,600,000 in September. January shipments of radios totaled 500,000, compared with 250,000 in the final quarter of 1945.

January production of automobiles, refrigerators, washing machines, electric irons, vacuum cleaners and other consumers goods was affected in varying degrees by strikes and material shortages.

The contrast between the progress of strike-free

(OVER)

industries and that of strike-bound industries indicates how heavily the nation, including manufacturers, their employees and the public, will pay for these needless and futile work stoppages. The pity of it is that official Washington as yet has only a slight inkling of the havoc its bungling has wrought and is painfully sluggish in applying the obvious correctives. —pp. 91, 92, 94

• • •

LET MACHINES DO IT! A study of recently developed lathes convinces this publication's machine tool editor that American industry is at the threshold of a new era of cemented carbide cutting tools, microscopic limits on fits and finishes, instrumentation, electronic control, automaticity and high wage scales.

All of these features reflect the influence of recent technological progress and economic pressures. The advent of carbide tooling has caused designers to revise drastically their traditional standards of power, rigidity, speeds and feeds. Interchangeable manufacture involved in modern mass production techniques demands unprecedented precision. High hourly labor rates and other factors call for a greater degree of automaticity, and this in turn brings in electronics and the many other developments which can contribute to the process of transferring the routine of repetitive operations from the hand and mind of the human machine operator to the fatigueless mechanisms of the machine itself.

We may witness astounding changes in machining in the next decade. —p. 120

• • •

ENVIABLE WAR RECORD: Nine American producers of tungsten and molybdenum products played an important and fascinating role in World War II.

Before the war, Chinese wolframite, chief source of tungsten ore, was transported over the Burma road. When war closed this route, the precious ore was flown "over the hump" by the Army Transport Command.

In spite of numerous handicaps, the nine companies managed to produce enough tungsten and molybdenum wire, rod, sheet and other products to supply parts for all transmitting, receiving and rectifier tubes for the Signal Corps; filaments for incandescent lamps to light industrial plants and offices "around the clock"; tungsten rod for spark plugs for high altitude flying by the air forces; tungsten contact points, electrodes and carbide cutting tools for industry; large quantities of tungsten and molybdenum for the Manhattan (atomic bomb) project; carbide for new armor-piercing projectiles; and exports to England and Russia.

This is a magnificent record for a small but vital industry. —p. 141

SIGNS OF THE TIMES: Demand by exhibitors for space in the Golden Jubilee Foundry Show to be held in Cleveland May 6-10 in connection with the fiftieth anniversary convention of the American Foundrymen's Association (p. 104) has caused AFA to extend its floor plans to make a total of 116,000 square feet available. This will make the May show the largest in the association's history. . . . Due partly to ODT pressure exerted during the war, OPA price regulations affecting commercial trucks are not as destructive to profits as are OPA price rulings on passenger cars. This fact is causing motor car manufacturers (p. 107) to focus renewed attention upon possibilities in the truck field. . . . Annual report of Warner & Swasey Co. indicates that in addition to turret lathes, which have been its standard product for 66 years (p. 111), the company will manufacture electrocycle lathes, precision tapping and threading machines, multiple-spindle automatics, pin drafting machines, knitting machines and grading machines. . . . A Los Angeles banker, addressing the Los Angeles Credit Men's Association (p. 113), declared that with 325,000 persons engaged in manufacturing Los Angeles is the fifth largest industrial city in the nation. . . . Andrew J. Higgins Jr., New Orleans shipbuilder, explained to a Dallas, Tex. audience (p. 119) that porcelain-enameled steel houses will be the chief postwar project of the Higgins enterprises. . . . Exposition sponsored by the Toledo district of the Pressed Metal Institute (p. 130) emphasized the marked expansion in the use of stampings in recent years in the production of strong, light, attractive and low-cost consumer and industrial products. . . . Superdraulic Corp., Dearborn, Mich., has developed a small, compact radial-type hydraulic plunger pump embodying unusual principles of design and construction (p. 134) which promises to facilitate the application of hydraulic power to drives in automotive, railroad and marine equipment. . . . Supreme Court's decision in the case of Roland Electrical Co. broadens the application of the Fair Labor Standards Act (p. 102) to companies rendering service to companies producing goods for interstate commerce. . . . Economic Stabilizer Bowles was off base when he tried to assert Ford Motor wanted to charge "outrageous" prices for cars in peacetime (p. 108) and he was tagged out neatly on a quick pitch by Henry Ford II. . . . Earnings of 13 steel producers for 1945 and for the fourth quarter (p. 94) were off 2.4 and 18 per cent, respectively, from comparable 1944 earnings.

E. C. Shane

EDITOR-IN-CHIEF

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STEEL
March 4, 1946

New Wage-Price Policy Adds to Uncertainty

Large segment of metalworking industry strikebound two weeks after promulgation. New walkouts threatened as coal miners and other organized workers prepare to demand higher wages. Government policy continues confused

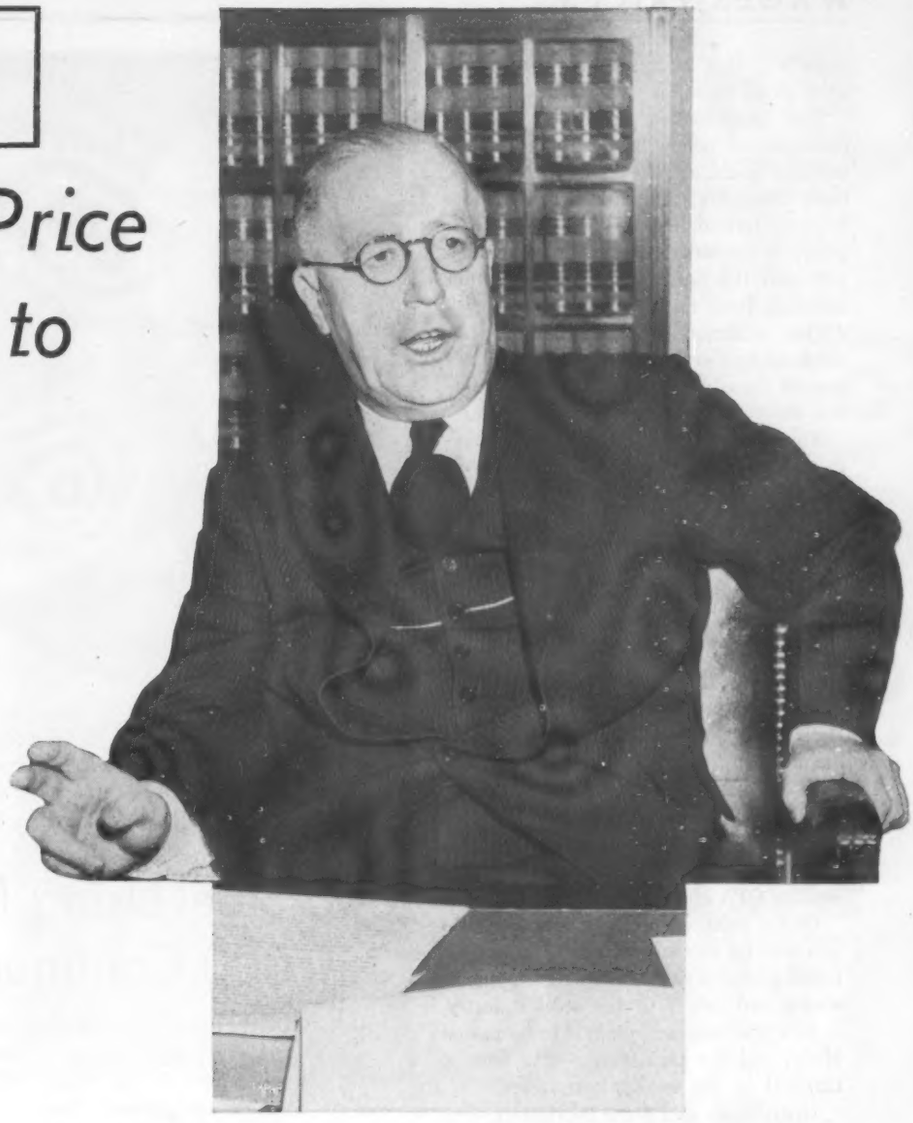
ANY early optimism that the administration's new wage-price policy would offer a formula for quick settlement of industrial disputes and a return to full production and full employment is fading rapidly.

Two weeks after settlement of the basic steel strike by the device of granting higher wages and higher prices, a large segment of the metalworking industry continues strikebound. Primarily this segment comprises nonintegrated steel companies and steel-using companies which have contracts with the United Steelworkers of America. Other metalworking companies are facing the prospect of enforced idleness as a result of having to pay higher prices for their raw materials and higher wages while the ceiling prices of their own products remain fixed.

Other potential strikes are in the making as organized workers prepare to demand wage increases equal to or possibly greater than those granted to the steelworkers, some automobile workers, meat packers and certain other favored workers.

A current focal point of interest is the possibility of a shutdown in the soft coal mines next month. John L. Lewis is expected to ask substantial concessions for his United Mine Workers this month and if these demands are not met he may pull out the miners April 1. The UMW policy committee will meet in Washington March 11 to formulate specific demands.

Strikes and threats of strikes in transportation, power and other services vital to industry are adding to the confusion and uncertainty.



Confronted with widespread strikes and the threat of more to come, Secretary of Labor Lewis B. Schwellenbach occupies one of Washington's hot spots. He is shown above testifying before a congressional committee on pending labor legislation. NEA photo

In fact, confusion and uncertainty are the dominant characteristics of the new wage-price policy. As yet there has been no adequate clarification of the policy that allows business men to know what they will be permitted to do. Official statements indicate that price control will be relaxed in certain situations to stimulate production. Some of the major strikes, notably steel, have been settled on the basis of specific understandings as to the extent of price increases to be granted. But for thousands of other businesses and industries the picture is not yet clear.

After giving way in the steel case and putting on record the $5 overall increase to be permitted in return for an 18½-cent wage increase, stabilization officials now announce that in future cases management will not be permitted to insist on specific price adjustments in advance of wage agreements.

Stabilization Director Chester Bowles said last week that wage and price adjustments cannot be handled on a "bargain counter basis." If the government is to stop inflation, "the government cannot be a party to economic horse-trading," he declared.

After wage agreements have been reached between labor and management and certified to the Wage Stabilization Board, the Office of Price Administration will then consider them along with other cost factors in adjusting prices, Mr. Bowles said. These adjustments will be based on the modified standard outlined in the President's executive order of Feb. 14 which provides that on the basis of normal volume any industry will be assured at least its prewar earnings during the coming year.

This policy leaves much to be desired by companies which have been operating on a narrow profit margin or at a loss

since V-J Day and now are confronted with rising material and labor costs.

The uncertainties posed by present price-control policy have resulted in an increase in the attacks on OPA. Although many observers absolve OPA of responsibility in formulating the new wage-price policy, it appears the price-control agency will bear the brunt of the dissatisfaction resulting from the policy's operation.

One evidence of this was seen last week when the Senate halved the OPA's request for additional funds for price control enforcement.

Further difficulties for OPA are expected to accompany the expected increase in the cost of living. Marriner S. Eccles, chairman of the Federal Reserve System, told Congress last week he expected the new policy would result in an increase in living costs of another 10 per cent over prewar levels. Stabilization Director Bowles and Reconversion Director John W. Snyder believe Mr. Eccles' forecasts to be rather high and Mr. Bowles "hopes" it can be held to half the figure mentioned.

Overall effect of these factors—a rising cost of living and confusion as to what action may be taken under the present wage-price policy—are expected to weaken OPA control.

OPA's most difficult immediate problem will be the adjustment of prices for metal products necessitated by the higher wages and prices in the steel industry, in how the increased price is to be passed along, and the maintaining of a flow of material to the smaller consumers.

Distributors and some fabricators were informed last week they will be permitted to pass on the steel price increase to their customers, but will be required to absorb the wage increase pending such time as they can show hardship.

Alarm lest the nonintegrated steel companies be "snuffed out" through inability to buy semifinished steel was expressed by CIO President Philip Murray, whose steelworkers' union now is striking these same nonintegrated companies and demanding they meet the 18½-cent wage increase granted by the larger companies. Mr. Murray proposed that the government reinstate allocation to insure the small companies an adequate supply of semifinished.

Metal Furniture Makers Granted Price Increase

Office of Price Administration has granted manufacturers of metal household furniture (kitchen cabinets, dinette sets, porch chairs, and other such pieces) a reconversion increase of 5 per cent over their 1941 prices. Wholesalers and retailers must absorb the increase.

Further rise in the cost of living as result of the administration's wage-price policy was predicted last week by Marriner S. Eccles, chairman of the Federal Reserve Board. He estimated costs would rise to 40 per cent above prewar levels, compared to present costs which are about 30 per cent above prewar. Mr. Eccles is shown at left; at right is Rep. Brent Spence of Kentucky. NEA photo

800 Steel-Using Firms Employing 350,000 Continue Strikebound

ALTHOUGH basic steel production is climbing slowly toward the pre-strike levels, 800 companies employing 350,000 workers continue strikebound. They are the fabricating companies and nonintegrated steel companies which have contracts with the United Steelworkers, and are confronted with demands for an 18½-cent wage increase, but which have received no price relief.

J. A. KRUG

Former chairman of the War Production Board, Mr. Krug has been appointed Secretary of Interior, succeeding Harold L. Ickes. He may be called upon to administer the coal industry in event that industry is struck

Only a very few of these companies have signed new contracts with the union in accordance with the President's recommendation for a wage increase.

These plants, which purchase steel to be made into a wide variety of end products, do not regard the settlement in the basic steel industry as being applicable to them. They were not consulted nor did they have any part in the deliberations at the White House which preceded the basic steel settlement.

Despite the submission of ample evidence that most of the 350,000 workers employed by these companies cannot return to their jobs because the steel-using fabricators are unable to pay increased prices for steel, in addition to hourly wage raises of 18½ cents, while still held to ceiling prices on their own products, no definite move to solve this problem was in sight at week's end. The plight of the fabricators has been set forth by individual companies and by groups of fabricators, including the Tristate Industrial Association, Pittsburgh, headed by Col. James S. Ervin, presi-

dent, Mackintosh-Hemphill Co., and the Non-Basic Steel Co-ordinating Committee, headed by E. S. Evans Jr., president of Evans Products Co., Detroit.

The Tristate association reported that only three of its 56 member companies closed by the steelworkers' strike have been able to reopen their plants. Two of these member companies make in their own plants more than half the steel they use and therefore are classified as "basic" steel companies.

Attempts of the association to obtain clarification of the government's new wage-price policy and how it affects the steel-users have been futile, declares Ray Booth, secretary of the group.

"These companies have no assurance from responsible government officials that they will be granted price increases to compensate for increased steel costs and wages. Because they were losing money on their products even before the strike was called, many of them simply cannot pay the higher labor and material costs unless the prices of their own products are adjusted immediately."

Specific cases of hardship affecting some of these companies are cited by the association.

Costs Make Production Unprofitable

A firm that fabricates sheet metal products and employs 320 workers, estimates that the company would lose $50,000 in the first six months of operation if required to increase wages 18½ cents an hour. This company makes 20 different items sold in several fields. Since V-J Day it has lost money on all of these 20 products. With increased wages and increased cost of its steel, which the company "guesses" will be in the neighborhood of $10 a ton for the kind it uses, price relief of about 10 per cent will be needed on some items and about 16 per cent on others just to break even.

"We will need price increases of at least 35 per cent to keep out of the red," declared an official of a firm in the heavy machinery industry. "This is an overall figure. On some items we will have to add more than 50 per cent; but none less than 25 per cent. Our firm lost $70,000 the last six months of 1945. If we have to pay our 225 employees 18½ cents an hour more, and, at the same time, absorb a price increase of $5 or more a ton for our steel, we will lose $320,000 the first year. It doesn't make sense. That loss will be on all our products."

Another firm in the heavy industrial equipment field employing 330 declared it will lose $200,000 a year with the increased wage and steel costs. This company, too, "guesses" that the price of its steel will be $10 a ton more.

ROBERT R. WASON

New wage-price policy of the administration will work hardship on business, especially the smaller concerns, Mr. Wason, president of the National Association of Manufacturers, told business men of Ashtabula, O., last week. Mr. Wason, a native of Ashtabula, was the guest at the fiftieth anniversary dinner of the city's chamber of commerce. He is shown above swinging a sledge in the Ashtabula Iron Works where he once worked. NEA photo

This company has been losing money on about half of its products for the last four years. The actual loss on these products in this period was $200,000, but this loss was offset by the profit it had been able to make in the past on other items.

A manufacturer of machinery parts, with 150 employees, lost $35,000 in the six-month period from July 1 through Dec. 31 last year.

"We figure that a wage increase of 18½ cents an hour will boost our wage cost $5500 a month," an official said. "The steel we buy, at $5 more a ton, will add another $2000. These two items mean an additional loss of $47,000 in a six-month period, or a total loss of $82,000. Every one of the many items we produce is being made at a loss now. Probably about 15 per cent would have to be added to our present prices just to enable us to get out of the red."

Effect of Steel Increase On Costs Not Uniform

Full effect of the steel price increase on consumers' costs will not be known until buyers have had sufficient time to analyze their position based on specific product prices as announced by the Office of Price Administration.

While steel price ceilings have been advanced an overall average of $5 per ton, allocation of this increase to the various products varies with the result that the net increase in price to consumers depends upon the product or products each purchases. Consequently, the price increase is not uniform to all buyers.

Meetings of the various products committees were held with OPA all last week as that agency struggled to get its ceiling price list in shape for issuance March 2. Definite information as to what specific product prices would be promulgated was impossible to obtain but rumor and speculation in the market brought forth a number of guesses some of which contradicted each other.

Representatives of the basic steel producers are reported to have suggested specific product prices to OPA but it was not clear the government agency would follow these suggestions. One report had it the steelmakers asked for a $3 per ton increase on all semifinished steel products with the exception of billets on which $5 per ton increase was reported sought. Also, it was said, they asked for a $5 increase on plates, shapes and bars, $5.30 on sheets, and $5.75 on wire products and merchant pipe.

Steel warehouses, it is understood, will be permitted to pass along to their customers the increase in steel prices but will not be permitted to add to their list prices added costs resulting from the increase in wages which they have granted unless they can show such cost absorption works a hardship upon them. To prove such, it was pointed out by the jobbers, up to three months experience under the new costs will be necessary in order for them to accumulate data on which to prove hardship.

OPA plans to wrestle with the problem of pricing fabricated goods immediately

(*Please turn to Page* 214)

Steel Industry's 1945 Net Declines

Profit of 13 producers off 2.4 per cent for year. Last quarter income down 18 per cent compared with like period of 1944

NET EARNINGS of 13 steel producers representing 88 per cent of the industry's ingot capacity totaled 2.4 per cent less in 1945 than in 1944 and marked the fourth consecutive year of decline.

Total net earnings of those 13 companies in 1945 were $150,021,545, compared with $153,851,615 in 1944.

Although net earnings of 12 producers in the fourth quarter of 1945 totaled $35,729,139, or 20 per cent above the $29,640,308 reported by 11 companies in the previous quarter, they were 18 per cent under the 12 producers' aggregate of $43,888,389 in the last quarter of 1944.

While the net earnings of the 13 producers totaled less in 1945 than in 1944, six of those producers reported 1945 net incomes above 1944. However, declines in net earnings of the other seven companies more than offset the gains of the six producers.

Of the 13 companies, two reported net losses in the fourth quarter of 1945.

Steel Producers' Net Earnings Summarized

	Year 1945	Year 1944	Fourth Qtr. 1945	Third Qtr. 1945	Fourth Qtr. 1944
United States Steel Corp.	$ 57,045,093	$ 60,791,281	$13,267,300	$11,624,420	$10,985,624
Bethlehem Steel Corp.	34,947,116	36,167,723	11,447,858	7,761,667	16,379,398
Republic Steel Corp.	9,543,443	10,130,296	1,569,516	1,617,675	3,659,504
Jones & Laughlin Steel Corp.	8,082,082	7,966,663	2,367,774	1,343,295	2,488,629
Youngstown Sheet & Tube Co.	7,512,250	7,944,921	1,664,635	1,697,943	2,691,767
National Steel Corp.	11,117,764	10,751,369	2,207,091	2,027,502	2,670,396
Inland Steel Co.	9,861,210	10,249,395	2,632,593	2,016,017	2,578,486
Wheeling Steel Corp.	3,950,252	4,384,789	530,774	1,085,887	1,240,339
Colorado Fuel & Iron Corp.	1,954,979‡	1,672,061‡	452,214 *	42,196	611,711
Lukens Steel Co.	2,751,478†	375,939†	156,929 *	.....	36,774
Continental Steel Corp.	612,543	508,660	113,412	138,567	64,758
Keystone Steel & Wire Co.	1,588,209‡	1,467,301‡	537,329	285,139	481,003
A. M. Byers Co.	1,055,126††	1,441,217††	.....	.....	.....
Totals	$150,021,545	$153,851,615	$35,729,139	$29,640,308	$43,888,389
Pig Iron Capacity Only:					
Woodward Iron Co.	$ 206,550	$ 843,767	.....	.....	.....

‡ For period ended June 30; * Loss; † For period ended Oct. 6; †† For period ended Sept. 30.

Industrial Production Drops to Lowest Level Since Spring, 1941

BECAUSE of large-scale work stoppages industrial production has dropped to the lowest levels since spring, 1941, the January report of the Civilian Production Administration, issued last week, shows. At the same time John D. Small, CPA administrator, predicted February production would show a further decline, upturn being dependent upon solution of wage-price problems now plaguing the nation.

Despite labor difficulties, however, production of some consumer goods, such as automobiles, trucks, tires, radios and sewing machines, showed an increase in January over December, Mr. Small reported. He pointed out, though, that the month-long steel strike delayed by several weeks the achieving of prewar levels of output in many lines and predicted it will take five or six weeks for the steel mills to return to full production.

Necessary production and distribution controls cannot succeed unless they are accompanied by fair and equitable prices, Mr. Small said, holding that a limited number of controls must be continued because war-created maladjustments still exist. He also reported that while the strike situation has increased inflationary pressures by widening the gap between goods and demand, there were no significant shifts in overall price levels during January.

Latest report of CPA on consumer goods industries shows:

AUTOMOBILES—Despite work stoppages, 58,757 passenger cars were produced in January, nearly double the December rate. Shortages of upholstery and parts may curtail future production.

NYLON HOSIERY — Production "should be in full swing in 60 to 90 days, but it will be many months before supply will begin to catch up with demand."

RADIOS—January shipments totaled about 500,000, as compared with 250,000 during the final three months of 1945. The January rate was 45 per cent of prewar monthly output.

REFRIGERATORS—Strikes affecting three major producers kept January production and shipments down by 20 per cent to 100,000 units, as compared with 125,000 in December.

SEWING MACHINES—January production was 27 per cent over December, but output still was only about 25 per cent of prewar rate of 48,000 monthly.

WASHING MACHINES—Also affected by the electrical workers' strike. Output was "probably less" than the 99,000 units shipped in December.

ELECTRIC IRONS—Similarly affected by the strike, after an upward monthly trend of about 867,000 units for the fourth quarter of 1945. This was 76 per cent of the prewar average rate.

VACUUM CLEANERS—Shortages of parts retarded shipments in January. They had risen to 210,000 units in the fourth quarter of 1945, or 45 per cent of prewar average.

PASSENGER TIRES—January production exceeded 4,800,000 tires, as compared with 3,900,000 in December and 2,600,000 in September.

TESTIFIES ON SEAWAY: Attorney George F. Shafer, former governor of North Dakota, testifies before a Senate Foreign Relations subcommittee at hearings on the proposed St. Lawrence Seaway, perennial topic for debate in Congress. Mr. Shafer is showing the committee a chart of the proposed improvements to illustrate how the proposed waterway would make the sea available to the upper lakes regions. NEA photo

St. Lawrence Seaway Arguments Heard by Senate Subcommittee

REPRESENTATIVES of industry opposing completion of the St. Lawrence seaway project last week made clear their position in testimony before a Senate Foreign Relations subcommittee considering the proposed legislation. Their testimony followed that of the preceding week by proponents of the project.

Prominent among those testifying in opposition to the undertaking last week were R. L. Ireland Jr., president, Hanna Coal Co., Cleveland; Hubert B. Fuller and Andrew H. Brown of the Cleveland Chamber of Commerce; Gilbert R. Johnson and A. T. Wood of the Lake Carriers Association, Cleveland.

Completion of the seaway would mean displacement of millions of tons of Ohio-produced coal, Mr. Ireland claimed, declaring that the completion of the project would have "many ruinous consequences." He said the finding of large deposits of high-grade iron ore in Labrador appeared very promising but added that his company was of the view that the new ore deposits would be of far greater benefit without the seaway than with it because of the cheap foreign goods that would flood the country and reduce the United States standard of living.

Mr. Brown, transportation commissioner of the Cleveland Chamber of Commerce, told the subcommittee that there is no economic justification for the seaway, insisting that any benefits derived from the waterway would go to shipping interests, mostly foreign, which would carry grain out and coal in.

The seaway-power project would be "seriously detrimental" to Cleveland, Mr. Fuller testified, adding that a survey of Cleveland industrial plants showed that "no substantial use" of the waterway would be made. Mr. Wood contended Canadian coast regulations make it impossible for American lake ships to compete with Canadian vessels, while Tom J. McGrath, executive director of the National St. Lawrence Project Conference, an organization opposing the seaway, called the proposed legislation a "patchwork job," maintaining that the whole matter should be reviewed and revised.

Any iron ore importation that would replace present Lake Superior supplies would have a disastrous effect on the operation of the Great Lakes fleet, L. C. Sabin, vice president, Lake Carriers Association, Cleveland, told the group.

He testified that the Lake Superior mines furnish about 80 to 85 per cent of the ore required for United States production of iron and steel.

"The availability of this cheap transport of the raw material, 800 miles for about 80 cents per ton, is an invaluable aid to the United States in time of war," he continued. "From 1936 to 1940 the gross tonnage of iron ore transported on the lakes from mines to furnaces averaged 47 million tons, while in the 1941-1945 period the average annual movement was over 82 million tons, an increase of 75 per cent.

"It is evident the fleet has an overcapacity for ordinary peacetime needs but anything which tends toward its depletion, as the deepened St. Lawrence does, would have most serious consequences in time of emergency."

Clare J. Goodyear, president of the National Association of Shippers Advisory Boards, said the project would mean laying off railroad workers for the seven-month period each year when the canal could be operated.

Proponents Cite Advantages

Proponents of the project, testifying the preceding week, included Secretary of Commerce Wallace who declared the seaway would increase foreign trade, cut transportation costs and not cripple the railroads. He estimated that on a seaway traffic volume of 46 million tons for 17 specific commodities freight savings would range between $14 million and $17 million, adding that on the basis of a total American seaway traffic of 10 million tons yearly the savings in freight charges might total $36 million. The secretary insisted that even if all the traffic generated by the seaway represented a direct diversion from the railroads the total ton miles lost to the roads would not exceed 1 to 2 per cent of the total miles they would be called upon to handle.

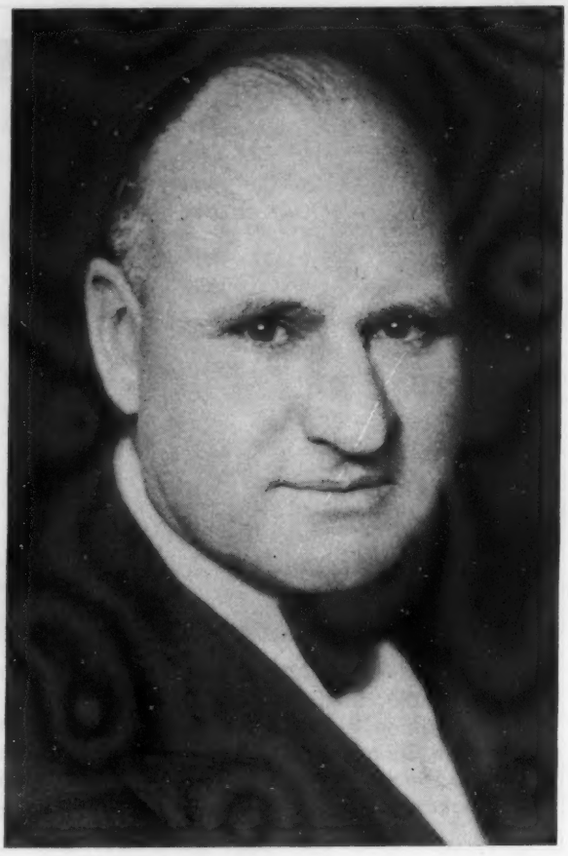
Mayor Edward Kelly of Chicago told the committee that if for no other reason, the seaway should be opened in the interest of national defense while Mayor Edward Jeffries of Detroit said that while Detroit had solved its production problem it had not solved the transportation problem and that construction of the seaway would greatly resolve that problem.

Congressional supporters of the project testifying before the subcommittee included Rep. Hadwen C. Fuller (R., N. Y.) and Rep. Alvin E. O'Konski (R., Wis.). Representative O'Konski said that 300,000 persons in his district were unanimously back of the project and desired it no matter what the cost.

Army engineers estimate the total cost of the seaway to the United States would be in excess of $342 million.

Minerals Symposiums Rank High on Program of AIME Convention

Attendance exceeds 2000 at Chicago meeting of organization, first in 34 years held outside New York. Papers and discussions on wide variety of topics feature numerous sessions. Honors and awards for outstanding achievements presented



DR. ZAY JEFFRIES

MORE than 2000 members of the American Institute of Mining & Metallurgical Engineers attended the 163rd meeting of the institute at the Palmer House, Chicago, Feb. 25-28. This was the first time in 34 years that the annual meeting has been held outside New York city.

Highlights of the convention were the economic symposiums on minerals of North and South America; atomic energy, theoretical and industrial; a full report on German developments in coal prior to World War II; and a petroleum economics session.

At the annual banquet Wednesday evening the medals and honors of the institute for 1946 were presented. The John Fritz Medal established in 1902 was presented to Zay Jeffries, director, chemical department, General Electric Co., Pittsfield, Mass., "for leadership in the solution of problems affecting the production, conservation, substitution and scientific appraisal of metals and alloys." Dr. Jeffries was James Douglas Medalist in 1927, Howe Memorial Lecturer in 1930, and Institute of Metals Lecturer in 1924.

The William Lawrence Saunders Medal was presented to Fred Searls Jr., mining geologist, and vice president, Newmont Mining Co., New York, "for outstanding ability and discernment in the practice of mining geology and in the appraisal and development of mineral deposits in many parts of the world; and for effective participation in the formation of broad national policy in the prosecution of the war, thus bringing added distinction to himself and the mining profession."

The Anthony F. Lucas Medal was presented to J. O. Lewis, petroleum engineer, Houston, Tex., "for his pioneer work in laying the foundation of petroleum engineering through early recognition and lucid exposition of the energy relationships in petroleum reservoirs; for his vision and leadership in developing secondary recovery methods and his large influence in the general improvement of petroleum production practices."

The J. E. Johnson Jr. Award was presented to J. J. Alexander, assistant superintendent of power department, Republic Steel Corp., Cleveland, "for developing a method for connecting two turboblowers in series to blow 100,000 cu ft of wind per min at high pressure, and for his work on adding a controlled amount of moisture to the blast." This award was established to encourage young men in creative work in the metallurgy and manufacture of pig iron.

The Rossiter W. Raymond Memorial Award was presented Capt. J. H. Hollomon, chief of physical metallurgical section laboratories, Watertown Arsenal, Watertown, Mass.

Following the presentation of the medals and honors, Louis S. Cates, president, Phelps Dodge Corp., New York city, was introduced as president of the institute for 1946.

A feature of the Thursday morning session of the Iron & Steel Division was presentation of the 23rd Howe Memorial Lecture on "The Blast Furnace Process and Means of Control," by T. L. Joseph, professor of metallurgy, University of Minnesota School of Mines at Minneapolis.

Digest of some of the papers presented at the various sessions follow:

An Equilibrium Study of the Distribution of Phosphorus Between Liquid Iron and Basic Slags, by T. B. Winkler, Bethlehem Steel Co., Bethlehem, Pa., and John Chipman, professor of metallurgy, Massachusetts Institute of Technology, Cambridge, Mass.

Dephosphorization has been found to be improved by the following factors: Decreased temperature, increased iron oxide content of slag and metal and increased base-acid ratio of the slag, such as, increased lime, magnesia, manganese oxide and decreased silica content of the slag. Fluorspar additions to the slag have no adverse effect on the dephosphorizing power of the slag.

° ° °

The Boron-Oxygen Equilibrium in Liquid Iron, by Gerhard Derge, member of the staff, Metals Research Laboratory, and associate professor, department of metallurgical engineering, Carnegie Institute of Technology, Pittsburgh.

Several of the solidified ingots were examined microscopically, to provide an additional check on the chemical analyses for oxygen and boron. Large slag inclusions were not observed, but the low-boron, high-oxygen samples showed structures typical of iron silicates that have separated during freezing. The intermediate boron samples showed fewer of these iron silicates and increasing amounts of the intergranular constituent commonly associated with high-boron steels; while the high-boron samples showed large patches of this boron con-

stituent. These observations and general consistency of the data indicate that the amounts of boron found in the iron are not due to slag inclusions. If the latter possibility were correct, the high-boron samples would then be high in oxygen, and this is not true.

The results show that the amounts of boron of commercial interest can be introduced into steel from boron oxide compounds and that these amounts are subject to control by suitable oxygen control.

° ° °

Hot-Pressing of Iron Powders, by O. H. Henry, assistant professor of metallurgical engineering, Polytechnic Institute of Brooklyn, Brooklyn, and J. J. Cordiano, research engineer, Hardy Metallurgical Co., New York.

The results of tests indicate the potent influence of time and temperature on the physical and mechanical properties of hot pressed iron powders. These properties are dependent upon the amount and rate of diffusion, which in turn depends on the number and area of intraparticle contacts, as well as on the amount of plastic deformation to which the compact is subjected. Increasing temperature and time at temperature under sustained pressure tends to increase each of these effects individually, with cumulative results.

The properties that can be obtained on hot pressed iron powders are far superior to the properties of cold pressed and sintered iron powders. However, the time, temperature, and pressure requirements are too severe for present-day commercial equipment. With advances in processing and materials, the hot pressing of metal powders should take its place as an important method of fabricating metal.

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Training of Metallurgical Engineers in the Steel Industry, by E. C. Wright, assistant to president, National Tube Co., Pittsburgh.

Development of metallurgical engineers in steel plants point to certain pertinent facts. The finished metallurgical engineer needs thorough understanding of statistics, ability to handle men, a thorough knowledge of the processes and operations in the plant and the ability to analyze difficulties and conduct research work. Essentials in the training are:

1. Manual skill in handling metallurgical laboratory equipment.

2. Three to six months of routine physical testing and preparation of statistical summaries of test results.

3. Several months in the metallurgical laboratory.

4. Final training in specifications for steel products that are in common manufacture.

° ° °

Sulphur Equilibria Between Liquid Irons and Slags, by N. J. Grant, assistant professor of process metallurgy, and John Chipman, professor of process metallurgy, Massachusetts Institute of Technology, Cambridge, Mass.

In slags of the type considered, ranging from strongly basic to slightly acid the manganese oxide and the magnesium oxide on a mol per mol basis are as good desulphurizers as calcium oxide. Fluorspar is neutral and does not affect the sulphur ratio. Alumina requires the same number of mols of base to neutralize it as does silica. Slag iron oxide (from 3 to 70 per cent) has only a dilute effect on the sulphur ratio. Therefore, the equation $CaO + FeS = CaS + FeO$ does not represent the controlling reaction in the open hearth; instead desulphurization is controlled by the distribution ratio of the metal sulfides between slag and metal.

Temperature in the range 1540 to 1660° C shows no measurable effect on the sulphur ratio. Temperatures greater than 1670° C appear to have a small harmful effect while temperatures below 1450° C and/or iron oxide below 3 per cent appear to have a beneficial effect on desulphurization. Sulphur distribution is controlled almost entirely by the excess base or acid count and the relationship is almost linear.

Basic open-hearth values of the sulphur ratio show reasonably good agreement with the equilibrium study values for the same basicity, regardless of carbon content. Sulphur equilibrium is closely approached during refining in the open hearth and the sulphur ratio in low carbon heats reaches its maximum value at about 8.

Spring Meeting of ASTM Is Held at Pittsburgh

Spring meeting of the American Society for Testing Materials, held at the William Penn Hotel, Pittsburgh, Feb. 25 through March 1, featured technical sessions on statistical quality control in its application to specification requirements, and a symposium on atmospheric exposure tests on nonferrous metals and alloys.

Despite threat of electric power strike earlier in the week the meeting attracted good attendance with registration exceeding 1000.

Throughout the week ASTM committees reviewed standard specifications and methods of testing materials. Decisions reached at these committee meetings will be published soon, and will be voted on at the society's annual meeting scheduled to be held at Hotel Statler, Buffalo, June 24-28.

Distribution of Workers in 235 Foundries Analyzed by National Founders Association

ANALYSIS by the National Founders Association, Chicago, of the distribution of workers among the various departments of 235 plants studied revealed that 17.9 per cent were molders, 15 per cent were employed in the cleaning room, 13.8 per cent consisted of foundry labor, and 8.5 per cent were coremakers. These four classifications accounted for 55.2 per cent of the labor force, the balance being distributed among numerous other departments.

Purpose of the study was to determine what labor was used and where, and to enable foundry operators to compare their own distribution with other plants in their field. In the following table, except for the composite figures, plants that produced more than one kind of casting were not included.

Classifications	Type and Number of Foundries				
	Composite	Nonferrous	Steel	Malleable Iron	Gray Iron
	235	39	27	18	133
Molders	17.9%	17.40%	10.8%	20.2%	22.1%
Coremakers	8.5	10.66	6.8	6.4	10.5
Cleaning room	15.0	15.47	23.6	4.0	13.7
Melting	5.1	7.00	4.5	3.5	5.4
Foundry labor	13.8	13.40	10.8	14.7	15.3
Miscellaneous labor	4.3	3.50	4.1	5.0	4.9
Shipping	2.2	1.98	1.0	7.7	1.9
Maintenance	5.1	5.00	6.2	3.7	3.8
Annealing	1.2	0.60	0.8	4.2	0.9
Heat treating	0.5	0.90	0.4	0.3	0.1
Engineers	0.4	0.70	0.4	0.3	0.4
Patternmakers	2.7	2.40	1.6	2.0	3.6
Clerks	2.2	2.67	2.2	1.8	2.1
Foremen	4.1	5.00	5.3	3.5	3.8
Supervisors	1.0	1.12	1.5	1.4	0.9
Superintendents	0.7	0.92	0.6	0.4	0.7
Others on payroll	15.3	12.04	19.9	20.5	9.8

Expect Steel Price Adjustments In Canada To Follow U.S. Action

Approximately one-third of material consumed in Dominion comes from United States. Importers must have government approval to pass along price increases. Higher wages and other costs confront domestic producing industry

TORONTO, ONT.

THE ADVANCE in steel prices which came with the settlement of the strike in the United States has given food for thought in government circles in Canada and while no direct action has been taken to follow, it is believed higher prices soon may go into effect here.

Higher wages are under discussion by the big three in the Canadian steel industry, Algoma Steel Corp. Ltd., Steel Co. of Canada Ltd., and Dominion Steel & Coal Co. Ltd., and union leaders, and if wages move up, it is almost certain that the government must move the steel price ceiling upward.

C. D. Howe, Minister of Reconstruction and Supply, already has forecast higher prices for steel in the event wage rates rise. A short time ago Wartime Prices & Trade Board sanctioned an increase of 35 cents per 100 lb for all classes of nails and it is understood that higher steel prices now are under consideration. Just what effect advanced prices will have on the retail price of consumer goods or various finished steel products is a matter of conjecture, as government officials have been endeavoring to curb skyrocketing prices and inflation. However, in some quarters it is the opinion that inflation is inevitable, but just how far it will go is anybody's guess.

So far Canadian consumers of United States steel have not determined their position with regard to purchases from across the line. Permission has not been granted to pass the increase along to consumers, and unless something of this nature is worked out it will mean further reduction in operating profits. In addition to the United States steel price advance, Canadian consumers are faced with the additional impost of 10½ per cent in making payment in United States funds.

Canadian Buyers Plan Switch

At present some large Canadian steel orders are pending for immediate placement in the States, and it is stated that some larger consumers are in urgent need of these special steels. Canadian mills, however, look for a substantial increase in steel buying as it appears possible that some companies that depended on United States steel have ideas of switching to materials of Canadian make wherever possible. It is apparent that structural steel fabricators will face the most serious results of the United States price advance as the greater part of the large shapes used in Canada are imported.

Special types of steel sheets, especially those for automobile work, also are imported as Canadian mills, up to the present, do not turn out the more highly finished lines. Alloy and stainless steels have been introduced by Canadian producers in the past four or five years and these makers gradually are extending their lines of output.

In recent years Canada has been importing between 750,000 and 1 million tons of steel of various classes from the United States, or approximately one-third of the steel used in this country.

PRODUCTION INCREASED: Output of jeeps at the Willys-Overland plant in Toledo is being speeded up as steel deliveries are resumed following the four-week strike. Above are shown units just off the assembly line. NEA photo

Ford Wins Wildcat Strike Ban in New UAW Contract

Ford Motor Co. last week formally signed a new contract with the UAW-CIO, which in addition to providing for an 18 cent per hour wage increase runs to May 30, 1947, incorporating a number of new provisions, one of which is aimed at preventing illegal work stoppages.

Under the terms of the agreement any employee found guilty of instigating, fomenting or actively supporting, or giving leadership to illegal work stoppages is subject to discharge without such cases being subject to regular grievance procedure.

An entirely new article is devoted to management prerogatives and responsibilities, including a provision that continued failure of an employee to produce on the basis of established standards will be cause for discipline, including discharge, unless failure is due to causes beyond his control. Any employee who participates in any plan to control or limit production speed also will be subject to discharge.

Also the contract provides for full-time representatives of the union to handle the grievance procedure in all but a few of the company's smaller plants, as a consequence the number of union representatives being reduced.

Housing Program Measures Speeded Up in Congress

Housing program got a push last week with the Senate passing a plan to provide 200,000 homes for veterans this year. The measure adds $250 million to a previous appropriation of $160 million, the addition being needed largely to dismantle unneeded army barracks. Meanwhile, the House debated the Patman bill providing 2,700,000 homes over the next two years. Principal objections were to a provision placing ceiling prices on existing homes and a provision for subsidy payments to speed production of scarce building materials.

Freight Rate on Scrap Moving to North Opposed

Group of shippers in North says existing rates from South are discriminatory in action before ICC

INTERSTATE Commerce Commission has been asked by a group of steel and scrap iron shippers to consider establishment of a representative freight rate to govern shipments of scrap from southern states northward, on the ground that present rates by the carriers involved are discriminatory.

The companies, including American Steel Abrasives Co., Galion, O.; Globe Steel Abrasive Co., Mansfield, O.; Pittsburgh Crushed Steel Co., Pittsburgh, and Duraloy Co., Scottsdale, Pa., in their petition to ICC, point out that they are all shippers of considerable quantities of scrap originating in Alabama, Florida, Georgia, Kentucky, Louisiana, Mississippi, North and South Carolina, Tennessee and Virginia, all encompassed in so-called Southern territory. This scrap movement is to northern destinations.

They point out that while there is no established rate on such shipments in Southern territory, there is a recognized alternate provision, but they allege that rates on these shipments by the carriers concerned have been discriminatory as compared with rates on similar goods shipped from points outside of this area, to destinations in other sections of the country.

The shippers have asked ICC to consider establishment of a rate on shipments of scrap from southern points northward, at the same level as presently applies on shipments of the same nature between southwestern points and so-called official territory.

Railroads Report Freight Car Situation Unchanged

Reports covering the month of January indicate that the freight car situation has not eased materially, according to the Association of American Railroads, Car Service Division. Although total shipments decreased somewhat as a result largely of widespread strikes, car detention increased substantially, and the heavy demand for box, refrigerator and coal cars continued without abatement.

Responsibility to a great extent for the lack of box car space, rests with the program of exporting 200 million bushels of wheat to foreign countries. Movement of grain and grain products continues to be the greatest single box car distribution problem which is confronting the railroads.

STEEL Index Ready

The index to Volume 117, STEEL, for the last six months of 1945, is ready for distribution. Copies will be sent to all subscribers requesting them.

Auto Industry Net in War Years Far Under Normal

Automobile manufacturing companies, excluding parts suppliers, averaged less than 40 per cent of the net profits on sales in war years compared with the normal pattern of profit in peacetime years, according to a recently completed survey. Returns average as follows:

	% net profit on sales
1939	8.25
1940	7.07
1941	6.45
1942	3.56
1943	3.10
1944	2.60
1945 (9 mos.)	2.94

Through the war, according to a survey by the Automobile Manufacturers' Association, reductions in the cost of weapons were reflected promptly in price reductions to the government rather than in profits, largely as a result of application of automotive production methods. Between the early months of the war and V-J Day average contract prices were reduced more than one-third on aircraft, guns, tanks and other war equipment.

The industry reported a low net of 2.6 per cent in 1944, peak year of war production.

Present, Past and Pending

■ WEIRTON STEEL TO BUILD 106 NEW COKE OVENS

WEIRTON, W. VA.—Koppers Co. Inc., Pittsburgh, will start construction soon of 106 coke ovens for Weirton Steel Co., this city. The project will consist of two batteries of 53 ovens each with a total capacity of 2600 tons a day.

■ RONSON ART METAL PLANS $1 MILLION EXPANSION

NEWARK, N. J.—Ronson Art Metal Works Inc. is undertaking a $1 million expansion program that will more than double productive capacity. Additional capacity will be provided in this city, East Stroudsburg, Pa. Toronto, Canada, and in England.

■ PRICE SCHEDULE SET FOR SALE OF SURPLUS SHIPS

WASHINGTON—House passed and sent to the White House last week a bill authorizing sale of surplus ships at a minimum of 31½ per cent of original cost on Liberty ships, 35 per cent for all other dry cargo ships, and 50 per cent for tankers. Maximums were set at 50 per cent of prewar domestic cost for dry cargo ships and 87½ per cent for tankers.

■ STEEL PLANT AT GRANITE CITY OFFERED FOR SALE

WASHINGTON—War Assets Corp. is offering for sale or lease the $12,700,000 government-owned steel plant at Granite City, Ill., operated by Granite City Steel Co. Facilities include three 140-ton open-hearth furnaces, machine tools, laboratory equipment, drills, grinders, and other equipment.

■ NEW STRUCTURAL MATERIAL DEVELOPED BY CHANCE VOUGHT

STRATFORD, CONN.—Chance Vought Aircraft Division, United Aircraft Corp., has developed a new structural material, Metalite, which consists of thin sheets of high-strength aluminum alloy, separated by a thick, low-density core of wood and bonded together to form a single light-weight unit.

■ NATIONAL TUBE PLANS TO REOPEN CHRISTY PARK WORKS

MCKEESPORT, PA.—National Tube Co. plans to reopen its Christy Park Works here soon on a limited basis. An order for gas cylinders and a prospective contract for spheroidal pressure vessels for distribution of propane and butane gases account for the plans to reopen this plant, closed down shortly after V-J Day.

■ EXPORT TIN PLATE REQUIREMENTS SCREENED DOWN

WASHINGTON—CPA last week established the symbol CXS under direction 10 to steel conservation order M-21 on export orders. Tin plate requirements for rehabilitation have been screened down to about 155,000 tons for the last half of 1946 and export requirements for other steel products face similar screening.

Liberalized Price Control Until Mid-1947 Advocated in CED Report

Monetary and budget policies to curb inflationary excess of demand should be developed now before price curbs are removed, study recommends. Urges existing tax rates be maintained and attempt made to balance budget by end of next fiscal year

AN ECONOMY free of wartime price and production controls and safeguarded against both inflation and depression should be the goal of national policy in the period of transition from war to peace. Recommendations to achieve this goal are presented in a research report, "Jobs and Markets," just issued by the Committee for Economic Development.

Existing government measures and policies are not now adequate to put such a policy into effect, according to the report.

The report points out that the immediate danger facing the economy is inflation. But the governmental measures to avert this danger, it states, should not lead into a continuing program which will shackle the free market.

The nation should start at once, while price control is effective, to develop monetary and budget policies which will curb the inflationary excess of demand. A liberalized, streamlined version of price control should be continued until June 30, 1947, to hold the line while monetary and budget policies are being developed.

Specific recommendations for governmental action are as follows:

1. *Maintain existing tax rates and make every effort to balance the federal budget at those rates in the fiscal year* 1946-1947.

2. *Bring under control the continuing expansion of our already huge money supply.*

3. *Extend price control authority to June* 30, 1947, *without further renewal except for rents.*

The report is the work of six economists who comprise the research staff of CED. They are: CED Research Director Theodore O. Yntema, Melvin de Chazeau, Albert G. Hart, Gardiner C. Means, Howard B. Myers, and Herbert Stein. The recommendations do not necessarily represent the views of the businessmen who form the CED's board of trustees and research committee.

The proposals offered not only seek to cope with existing conditions but to carry the economy successfully and safely to high level peacetime production and employment. Major requirements to implement the recommended program are the following:

1. Maintain existing tax rates and make every effort to balance the federal budget at those rates in the fiscal year 1946-1947. If strong inflationary pressure persists after high output and employment have been reached, taxes should be raised to generate a surplus. There is great danger that the hands of anti-inflationary fiscal policy will be tied by demands that the end of the war must bring a cut in taxes. Taxes may well have to be higher before they can be lower.

2. Bring under control the continuing expansion of our already huge money supply. The commercial and mutual savings banks now hold about $100 billion of federal securities, largely acquired during the war. The Federal Reserve banks are now committed to support the market for federal securities by buying such securities whenever their prices tend to fall. This means that if the banks desire to expand their commercial loans and investments—as they would in a period of inflation—they can obtain the reserve funds to support a multiple expansion of bank credit and deposits by selling government securities. Under these conditions the government monetary authorities could not stop a tremendous expansion of the monetary supply.

Reserve Requirements Proposals

The report proposes that the federal securities owned by the banks be made eligible to count as reserves against deposits and that the reserve requirements be made sufficiently high to immobilize most of the securities as required reserves. This will prevent the banks from acquiring excess reserves by selling securities to the Federal Reserve. Such a plan will re-establish control over monetary expansion with minimum disturbance to bank operations and Treasury financing. The enabling legislation should be enacted at once.

To discourage monetary expansion via the sale of federal securities by the non-bank public to the Federal Reserve banks, the level at which the bond market is supported should be set slightly below par. Sellers might then be faced with a minor capital loss which would act as a deterrent to such sales. (The redemption price of savings bonds would, of course, be unaffected by changes in the support level.)

FULL EMPLOYMENT: President Truman signs the full employment bill. He is holding aloft the pens used in the ceremony. One will go to each of the sponsors of the legislation. NEA photo

3. Extend price control authority to June 30, 1947, without further renewal except for rents. Determined use of monetary and fiscal measures will permit the elimination of price control by that date without serious inflation. Indefiniteness about the final end of direct controls will produce dilatory monetary-fiscal strategy.

The report stresses the importance of labor-management co-operation to raise productivity and, as that is achieved, to raise the general level of real wage rates. If the potential increase in productivity is realized, if high levels of employment are achieved and if business taxes can be safely reduced, real wage rates in 1948 of one-fourth to about two-fifths above 1939 seem possible and would be necessary, under these conditions, to provide adequate markets. Although we can only start toward this goal in 1946, we should move towards it, step-by-step, as productivity, output and taxes permit. Meanwhile, with wage rates rising, price control must avoid on the one hand a severe squeeze on profits and on the other hand very uneven distribution of wage increases. Price control should take prompt account of all actual cost increases, without distinction between approved and unapproved wage increases.

Living with price control until June 30,

The CONE AUTOMATIC MACHINE COMPANY *sees many* GOOD THINGS AHEAD

It is reported that . . . . . .

The National Advisory Committee for Aeronautics proposes to release to schools, libraries and industries over 300 technical reports hitherto secret.

get ready with CONE for tomorrow

Lycoming is experimenting with two new aircraft engines: a 36-cylinder, 5,500 lb. radial developing 5,000 h.p., and a 12-cylinder, 2,100 h.p., weighing only 1,445 lbs.

get ready with CONE for tomorrow

Monsanto Chemical Co. has a plastic armor plate that has shattered machine gun bullets in tests.

get ready with CONE for tomorrow

Curtiss-Wright is working on an "uninhabited" airplane capable of 1,400 miles per hour.

get ready with CONE for tomorrow

Firestone is making a heavy-duty tire with a wire carcass for off-the-road trucking.

get ready with CONE for tomorrow

A new distillery, the largest of its kind in the Western Hemisphere, will be built in Maine to make alcohol from Aroostook County potatoes.

get ready with CONE for tomorrow

Shell Oil Company has a new combustion head for gun-type domestic burners that will cut fuel consumption 20% and is suitable for use on burners now in operation.

get ready with CONE for tomorrow

Eastman Kodak promises that any reasonably well equipped amateur will soon be able to make his own color transparencies and prints.

get ready with CONE for tomorrow

Jack and Heintz will manufacture the Skinner gasoline engine. This is a double-opposed "pancake" type, made largely of aluminum with a compression ratio of 8 to 1 and a weight of less than 2 lbs. per h.p.

Mellon Institute has found, after thorough testing, that solid magnesium alloys do not burn.

get ready with CONE for tomorrow

The Weather Bureau has begun a survey of the country's wind resources in anticipation of the use of wind power for generating electricity.

get ready with CONE for tomorrow

A new kind of glass made by American Optical Company transmits 90% of visible light rays, but only 10% of heat rays.

get ready with CONE for tomorrow

Fifteen years of research have led to a form of porcelain enamel, made by C. Hommel Co. of Pittsburgh, that is so thin as to be practically chipless.

National Carbon Company has a new oil made with a secret non-petroleum base, called "Prestone Motor Oil" that shows very little change in viscosity from 30° below zero to operating temperature.

get ready with CONE for tomorrow

Illinois Central and Edison General Appliance Co. have collaborated on the first all-electric dining car, scheduled to go into service early in 1946. The car has its own diesel generating plant which supplies all facilities for cooking, freezing, dish washing, garbage disposal and air conditioning.

get ready with CONE for tomorrow

The Celotex Corporation has patented a process for making building planks out of excelsior and Portland cement.

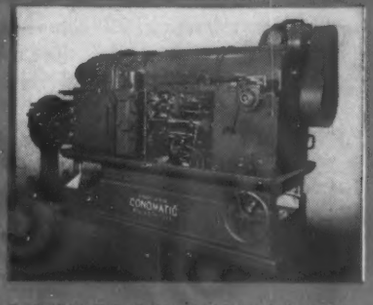
get ready with CONE for tomorrow

Another substitute for natural paint brush bristle is made of casein and was developed by the Eastern Regional Laboratory of the U. S. Department of Agriculture.

3 of these diameters are eccentric

This washing machine part, made of B-1112, is machined from round stock on a 1¼" 8-Spindle Conomatic in 10 seconds. Three of its five diameters are eccentric to .018".

Write to Cone for particulars.



Ask your CONE *representative to show you our new color motion picture*

CONE

AUTOMATIC MACHINE CO., INC. ★ WINDSOR, VERMONT, U.S.A.

26

1947, will be as difficult as learning to live without it. A policy of "calculated risk" in suspending ceilings on particular groups of commodities is necessary, to relieve the economy and OPA of unnecessary burdens. The standards for price relief should be liberalized. To this end, the minimum earnings standard for industry-wide price revision should be raised about one-third above the present level, which is the average return on net worth, before taxes, in the unprosperous years 1936-1939. Prices of individual products should be raised if they fail to cover average total costs.

While the immediate problem is inflation, the report recognizes that the transition, considered to last about three years, may include unforeseen variations of economic forces. Public policy must be flexible—prepared to deal promptly with a great intensification of inflationary pressure or a reversal into depressing tendencies. The "built-in flexibility" of the federal budget—its capacity to respond automatically and correctively to changes in employment and income—should be increased. This can be done by greater reliance upon income taxes and less upon excises, by permitting averaging in the corporate and personal income taxes, by prompter payment of tax refunds and by putting corporation taxes on a pay-as-you-go basis. Enlargement of unemployment insurance benefits would also be a powerful stabilizing influence. However, the authors point out that such automatic devices as may be introduced in the transition may not be enough. Deliberate short-run variations of taxes or expenditures may be necessary. Congress should prepare to enact promptly three or six month temporary changes in the tax rate on personal income in the first tax bracket. A large shelf of light public works should be made ready, to be started if depression threatens.

Should Establish Single Authority

The authors emphasize that any program that is to carry us through the uncertainties of the transition period and lay a basis for sustained high level employment must be implemented now; it cannot be improvised as we go along. Price control, monetary and fiscal policy impinge upon almost every element of economic policy. The instruments must be used together, to support each other, on the basis of a uniform appraisal of the problems and objectives. Focussing of responsibility for transition policy in a single authority is therefore considered of top-level importance by the authors. This authority might be a commission consisting of the heads of the agencies most immediately concerned, acting as a board under the general direction of the President, or a single individual.

Supreme Court Decision Broadens Application of Wage and Hour Law

Holds Fair Labor Standards Act covers companies rendering service to companies producing goods for interstate commerce. Wage and Hour Division of Department of Labor revising definition of authority under the act

WIDER application of the Fair Labor Standards Act may follow the Supreme Court's decision in the case of Roland Electrical Co., Baltimore, vs. Metcalfe Walling, administrator of the Wage and Hour Division of the Department of Labor. In this decision the court gives a rather complete definition of the authority granted by the act and the Wage and Hour Division now is reviewing a large area of its procedural policy and a new definition of its authority is expected to be issued soon.

Effect of the decision may be that substantially every manufacturing and business organization in the country may be found to be subject to the act's provisions.

Up to this time the division has issued orders to two classes of business organizations: 1—Those engaged in production of goods for interstate commerce, and 2—those rendering service to companies producing goods for interstate commerce. There never has been any doubt about the law's coverage of companies coming under the first classification. In a general way the division has considered the law as also covering companies in the second classification. But it has not attempted to enforce the law universally in this classification. In fact, it has considered quite a few lines of business as exempt. For example, it never has attempted to enforce any orders in the case of laundries serving companies engaged in interstate commerce. Now all these exempted industries are being reviewed and the chances are that they will be eliminated from their exempt status.

The order issued to the Roland Electrical Co. called for a permanent injunction restraining the company "from continued violation of the minimum wage, maximum hour, and report-making provisions of the Act." The United States District Court dismissed the case on the ground the Roland company was exempt. The Circuit Court of Appeals, on the other hand, held that the petitioner's employees "were engaged in the production of goods for commerce" and that the petitioner was not a "retail or service establishment" within the sense of the law.

It was because of this difference of opinion that the Supreme Court consented to review the case. Its decision, issued Jan. 28, is a complete definition of authority under the act.

First, the decision cites facts about the Roland business which were stipulated. It is engaged in Baltimore in "commercial and industrial wiring, electrical contracting, and dealing in electrical motors and generators, for private, commercial, and industrial uses." The firm had about 1000 active accounts "99 per cent of which are commercial or industrial firms." Its larger accounts included a telephone company "engaged in interstate commerce;" four were "engaged in the repair of ships, tugs, barges and other boats which were intended for movement in interstate commerce; and "the remaining companies, with the exception of the American Ice Co., were engaged in the production of goods for commerce". . . . No claim of coverage, says the court, is made on the ground that any of the petitioner's employees were engaged in interstate commerce, but only that they were producing goods for interstate commerce.

Evaluates Various Definitions

The nub of this decision is the Supreme Court's evaluation of various definitions in the Fair Labor Standards Act. Putting these definitions together in their own terms as applied to the facts in this case, says the decision, provides in effect that:

"Every employer shall pay (not less than the required minimum wages) to each of his employees who is employed in any process or occupation necessary to the production, in any state, of any part or ingredient of any articles or subjects of trade, commerce or transportation, of any character, for trade, commerce or transportation among the several states. This does not require the employee to be directly engaged in commerce among the several states. This does not require the employee to be employed even in the production of an article which itself becomes the subject of commerce or transportation among the several states. It is enough that the employee be employed, for example, in an occupation

PROBE ATOMIC SECURITY: Members of the Senate Special Atomic Committee have turned their attention to investigation of the security aspects of the United States atomic developments. Particularly, they are interested in whether anti-espionage provisions are adequate. Shown at hearings are, left to right: Sen. Brien McMahon (Dem., Conn.); Sen. Arthur Vandenberg (Rep., Mich.); James McInerney, Department of Justice; Maj. Gen. Leslie R. Groves, director of the Army's atomic bomb project. NEA photo

which is necessary to the production of a part of any other articles or subjects of commerce of any character which are produced for trade, commerce or transportation among the several states. This does not require an employee to be employed exclusively in the specified occupation. This does not require that the occupation in which he is employed be indispensable to the production under consideration. It is enough that his occupation be necessary to the production. There may be alternative occupations that could be substituted for it but it is enough that the one at issue is needed in such production and would, if omitted, handicap the production . . .

"The work of petitioner's employees has such a close and immediate tie with the process of production for commerce, and was therefore so much an essential part of it, that the employees are to be regarded as engaged in an occupation necessary to the production of goods for commerce . . . ."

The foregoing conclusions, says the decision, follow so clearly from the language of the statute as to make any further discussion unnecessary.

As to the second question, whether or not petitioner's employees are exempted on the ground that petitioner is a service establishment within the meaning of the act, the court had this to say:

"If read in a detached and broad sense," says the decision, "it can be made to exempt from the act the employees of the petitioner together with hundreds of thousands of other employees like them, to the serious detriment of the effectiveness of the act. However, if read in connection with the declared purpose of the act and in the light of its legislative history and administrative interpretation the clause does not reach employees engaged in the production of goods for commerce as those in this case. When so read, the exemption reaches employees of only such retail or service establishments as are comparable to the local merchant, corner grocer or filling station operator who sells to or serves ultimate consumers who are at the end of, or beyond, that flow of goods in commerce which it is the purpose of the act to reach. Without this clause such local establishments might find themselves technically covered by the act, not because they were producing goods for interstate commerce but because, for example, they were retailing milk near a state line and, therefore, might be regarded as actually in interstate commerce when delivering retail sales of milk to local customers, all of whom were ultimate consumers of it for their personal use, but a small proportion of whom lived across the state line from the milk dealer.

"Similarly, it was felt that without this exemption clause, the employees of a local merchant who purchased his goods from outside his state but retailed them all within his state to ultimate consumers across his counter, might, nevertheless, technically be covered by the act as being actually in interstate commerce because of his purchases, although his sales all might be at retail and beyond the end of the flow of goods in commerce . . .

"To the extent that sales or services are necessary for the production of goods for interstate commerce they generally are by that hypothesis not sales or services to an ultimate consumer for his personal use and, accordingly, are neither retail sales nor services of a comparable character within the meaning of (the law)."

Failure to include in the act's coverage "the multitude of employees engaged in establishments like that of the petitioner . . . . would take the heart out of the act," reads the decision. It goes on to state that "savings resulting from substandard labor conditions would be reflected directly into competitive costs;" and thus defeat the primary purpose of the act, which is to eliminate substandard labor conditions.

After reviewing the legislative history of the Fair Labor Standards Act, and particularly after studying the record of testimony at hearings conducted by the Senate Committee on Education and Labor when this act was in the formative stages, the Supreme Court included in its decision a finding that "there never was an intent expressed to exempt retailers other than local merchants of the type dealing with the ultimate consumer."

Priorities Aid Granted to Electrical Sheet Producers

Priorities assistance has been granted to producers of electrical steel sheets as well as to manufacturers of fractional horsepower AC electric motors for production materials and capital equipment, Civilian Production Administration has announced.

The "CC" priority rating may be assigned to a manufacturer of such motors to obtain all types of needed capital equipment plus construction materials, except electric high silicon steel sheets. Manufacturers of such steel sheets may obtain priority assistance for capital equipment and construction materials for new plants or for the expansion of existing plants.

FTC Orders Investigation of Export Screw Association

Federal Trade Commission has ordered an investigation under the Export Trade Act (Webb-Pomerene Law) of the Export Screw Association of the United States, Providence, R. I., its officers, executive council, and 12 member companies "to ascertain whether they have entered into agreements and engaged in restraint-of-trade practices in violation of law. The association is registered with the commission as an association which engages solely in the export of metal screws for use in wood products."

Foundrymen's 1946 Show Outgrows Original Plans; More Space Added

Arena section of Cleveland Public Auditorium added to exhibitors' space, making 116,000 square feet available. Exposition to be held in conjunction with 50th anniversary convention and will be the association's largest exhibition

MORE than 116,000 square feet of floor space has been made available to exhibitors at the Golden Jubilee Foundry Show to be held in Cleveland, May 6-10, in conjunction with the fiftieth anniversary convention of the American Foundrymen's Association.

Initial plans called for 100,000 square feet of exposition space in Cleveland Public Auditorium's Exhibit, North and Lakeside halls and the Arcade. However, demand for space outgrew the original allotments and the Arena, initially planned as a lounge and restaurant, has been made available to exhibitors.

The 1946 show will be the largest exposition of castings industry equipment and materials in history, according to the association. Biggest of previous equipment and supply exhibitions staged by the association, the foundry show held in Detroit in 1926, utilized about 81,000 square feet of floor space. The 1942 show at Buffalo, restricted by ODT regulations, covered 50,500 square feet.

Shows War-Born Strides in Industry

The unusual interest of foundry equipment and supply companies in the 1946 AFA exposition reflects not only eagerness to disclose developments and refinements made during the security-restricted days of the war and to dramatize contribution to the giant-stride advancement of the foundry industry over the past half-century, but also recognition of the fact the foundry industry, literally run on its bearings under the pressures of four years of wartime operation, plans a large amount of face-lifting, rehabilitation, replacement and repair to refit itself for peacetime production. Indications that the fiftieth anniversary convention of the association will set a new attendance record is also a factor in the heightening interest.

As of Feb. 15, the association reports, 240-odd applications for exhibit space more than "sold out" the original floor plan and forced an expansion of space in upper Lakeside Hall. The decision to open the Arena and locate the restaurant and lounges in the South Hall followed immediately.

The foundry show held in connection with the Third War Foundry Production Congress of AFA in Buffalo in 1944 had 244 exhibitors, the forthcoming exhibition, with the largest layout in its history, is expected to have an even greater list of exhibitors.

Sheldon V. Wood Nominated For Presidency of AFA

SHELDON V. WOOD

Sheldon V. Wood, Minneapolis, has been named for the presidency of the American Foundrymen's Association in 1946-47, it was announced recently. He is president and manager of the Minneapolis Electric Steel Castings Co., and has been nominated to succeed F. J. Walls, International Nickel Co. Inc., Detroit.

Max Kuniansky, vice president and general manager of the Lynchburg Foundry Co., Lynchburg, Va., completing a term as national director, was named to succeed Mr. Wood as vice president of the association.

Nominating committee selections for three-year terms as association directors are: Horace A. Deane, vice president, American Brake Shoe Co., New York; J. E. Kolb, pattern shop superintendent, Caterpillar Tractor Co., Peoria, Ill.; H. G. Lamker, superintendent of foundries, Wright Aeronautical Corp., Paterson, N. J.; Bruce L. Simpson, president, National Engineering Co., and Stowell C. Wasson, manager, National Malleable & Steel Castings Co., Chicago.

AFA members will vote for new officers and directors on May 9 at the annual business session of their fiftieth anniversary convention and exhibit in Cleveland which opens May 6.

Steel Founders Society Announces 1945 Awards

Steel Founders Society of America, Cleveland, awarded its certificates of merit and medals for 1945 at its 44th annual meeting which was held recently at Chicago. Certificates of merit were awarded to Frederick A. Melmoth, recently resigned vice president, Detroit Steel Casting Co., Detroit; John Howe Hall, steel castings consultant, Philadelphia; and Winfield C. Hamilton, research consultant, American Steel Foundries, Chicago.

The society's technical and operating medal for 1945 was awarded to John B. Caine, chief metallurgist, Sawbrook Steel Castings Co., Cincinnati, and its Frederick A. Lorenz memorial medal was awarded to A. M. Andorn, executive vice president and treasurer, Steel Castings Co., Chester, Pa. Mr. Andorn has been succeeded as president of the society by Edgar D. Flintermann, president and general manager, Michigan Steel Casting Co., Detroit.

Midwest Quality Control Conference Is Planned

Methods of controlling industrial quality and performance will be featured at the midwest quality control conference to be held at the La Salle Hotel, Chicago, March 5 and 6. W. E. Jones, conference chairman, recently said that statistical quality control is probably the newest of management's industrial tools for adequate plant control. The conference, sponsored by the quality control societies of the Middle West in conjuction with the Chicago Association of Commerce, will be the first of its kind in this section of the country.

Feature speakers at the conference include G. D. Edwards, director of quality assurance for Bell Telephone Laboratories, New York, and M. H. Eisenhart, president, Bausch & Lomb Optical Co., Rochester, N. Y.

Refrigeration Equipment Builders, Wholesalers Meet

In the face of an unprecedented demand for mechanical refrigeration and air conditioning equipment, nearly 100 manufacturers and twice that number of wholesalers will meet in Chicago this week to discuss ways and means of speeding both production and distribution.

Four days of conferences, joint sessions

and group meetings, will be held at the Stevens Hotel, Chicago, March 4 to 7, under auspices of the Refrigeration Equipment Manufacturers Association and the Refrigeration Equipment Wholesalers Association.

Among the subjects for discussion will be the impact of material shortages, strikes and other impediments to full production. With the industry's backlog of unfilled orders sufficient to insure capacity output for months, it is the aim of the conferences to work out schedules for faster movement of both complete units and parts through factories and distribution channels to domestic, commercial and industrial users.

The exhibition hall of the Stevens will be utilized during the meetings for conference booths to be used by manufacturers for talks with wholesalers. Each association will meet separately during the convention period, and a joint session of the two groups will be held.

The meeting also will serve to expedite plans of manufacturers for the all-industry refrigeration and air conditioning show in Cleveland in October.

Chicago Production Show Scheduled for Mar. 20-22

Emphasis at the Chicago Production Show will be on new advances in all departments of industrial production, tools, materials, instruments and miscellaneous equipment. The show, sponsored by the Chicago Technical Societies Council, will be held in the exhibition hall of the Stevens Hotel, Chicago, March 20-22, concurrently with the council's annual conference.

Gas Association To Meet In Toledo, Mar. 28-29

Harry A. Sutton, chairman of the Industrial and Commercial Gas Section, American Gas Association, has announced that the 1946 conference on industrial and commercial uses of gas will be held in the Commodore Perry Hotel, Toledo, O., March 28-29.

ASTE Show To Be Held In Cleveland, April 8-12

Plans for the exposition sponsored by the American Society of Tool Engineers at Cleveland's Public Auditorium, April 8-12, are progressing, it was announced recently. Expectations are that the show is going to be the largest and most comprehensive yet held by the society. Built around the annual convention of ASTE, the exposition will offer displays of at least 400 different classes of products, ranging from power-operated paint brushes to huge hydraulic presses. Electronic testing instruments, heat-treating furnaces and gear cutting devices are examples of the diversity of the displays.

According to C. V. Briner, president of the society, the show and the technical sessions which will accompany it will stress increased productivity, decreased costs and ever-improving standards of living for all people.

The conferences which are scheduled for afternoons and evenings during the show week are all geared to this theme of more goods at lower cost with higher wages, and range from "Plant Layout" to "Quality Control" and "Tool Engineering for Profit."

As is usual in connection with ASTE conventions, arrangements are being made for members of the technical society and other qualified visitors to the show to inspect plants in Cleveland and the vicinity.

Enamelers Club To Meet In Cleveland, Mar. 29

The Central District Enamelers Club will hold its next meeting at the Hollenden Hotel, Cleveland, Mar. 29. Following a dinner, officers for the coming year will be elected and a program emphasizing new markets and practices in porcelain enameling will be presented.

Speakers on the program will be F. C. Woleslagle, Carnegie-Illinois Steel Corp., Pittsburgh, and Market Research Committee, Porcelain Enamel Institute, Washington, speaking on "Preview of Future Markets for Porcelain Enamel Products;" and L. G. Simon, Harshaw Chemical Co., Cleveland, discussing "New Control Instruments and Methods."

SAE Section To Meet In New York, Apr. 3-5

Planning to meet future engineering requirements of commercial and civil aviation in the United States features the program of the Society of Automotive Engineers national aeronautical meeting to be held Apr. 3-5 in Hotel New Yorker, New York. Simplified planes for private owners, selection of aircraft for air transport operations, effective utilization of waste exhaust gases, progress in and applications of jet engines, airlines operating requirements, and use of new materials in aircraft construction are among the subjects of technical papers to be presented.

Westinghouse Plans Forum In Pittsburgh, Apr. 9-10

The practical applications of adjustable speed drive will be described by prominent machine tool engineers as one of the features of the 1946 Westinghouse Machine Tool Electrification Forum to be held at the William Penn Hotel, Pittsburgh, Apr. 9-10. Another feature will be a report on the progress of standardization of electrical equipment.

This will be the tenth annual forum sponsored by Westinghouse Electric Corp., Pittsburgh, and is planned to give machine tool engineers and executives of the machine tool builders an opportunity to discuss electrical problems.

Calendar of Meetings . . .

Mar. 4, Society of Automotive Engineers: German engineering evaluation meeting, Rackham Educational Memorial, Detroit. John A. C. Warner, 29 West 39th St., New York 18, is secretary and general manager.

Mar. 5-6, Quality Controls Societies and Chicago Association of Commerce: Midwest quality control conference, La Salle Hotel, Chicago. W. E. Jones, 901 Argyle St., Chicago, is chairman.

Mar. 8, American Foundrymen's Association, Philadelphia Chapter: Dinner meeting, Franklin Institute, Philadelphia. W. B. Coleman, W. B. Coleman & Co., Philadelphia, is secretary-treasurer.

Mar. 11, Chicago District Section, National Open Hearth Steel Committee, American Institute of Mining & Metallurgical Engineers: Technical meeting, Hotel Del Prado, Chicago. George A. Miller, 29 West 39th St., New York 18, is director.

Mar. 18-21, National Warm Air Heating & Air Conditioning Association: Forced Warm Air Conference, Michigan State College, East Lansing, Mich. George Boeddener, 145 Public Square, Cleveland, is managing director.

Mar. 19-20, Great Lakes Regional Advisory Board: Meeting, Hotel Carter, Cleveland. Association headquarters are at A5, M. C. Terminal, Detroit.

Mar. 20-22, Chicago Technical Societies Council: Production Show, Stevens Hotel. Paul A. Jenkins, 53 W. Jackson Blvd., Chicago 4, is executive secretary.

Mar. 28-29, American Gas Association: Conference on industrial and commercial gas, Commodore Perry Hotel, Toledo, O. Harry A. Sutton, chairman.

NOW . . .

A BULLARD CUT MASTER V.T.L. PUTS SPEED CHANGES AT YOUR FINGERTIPS

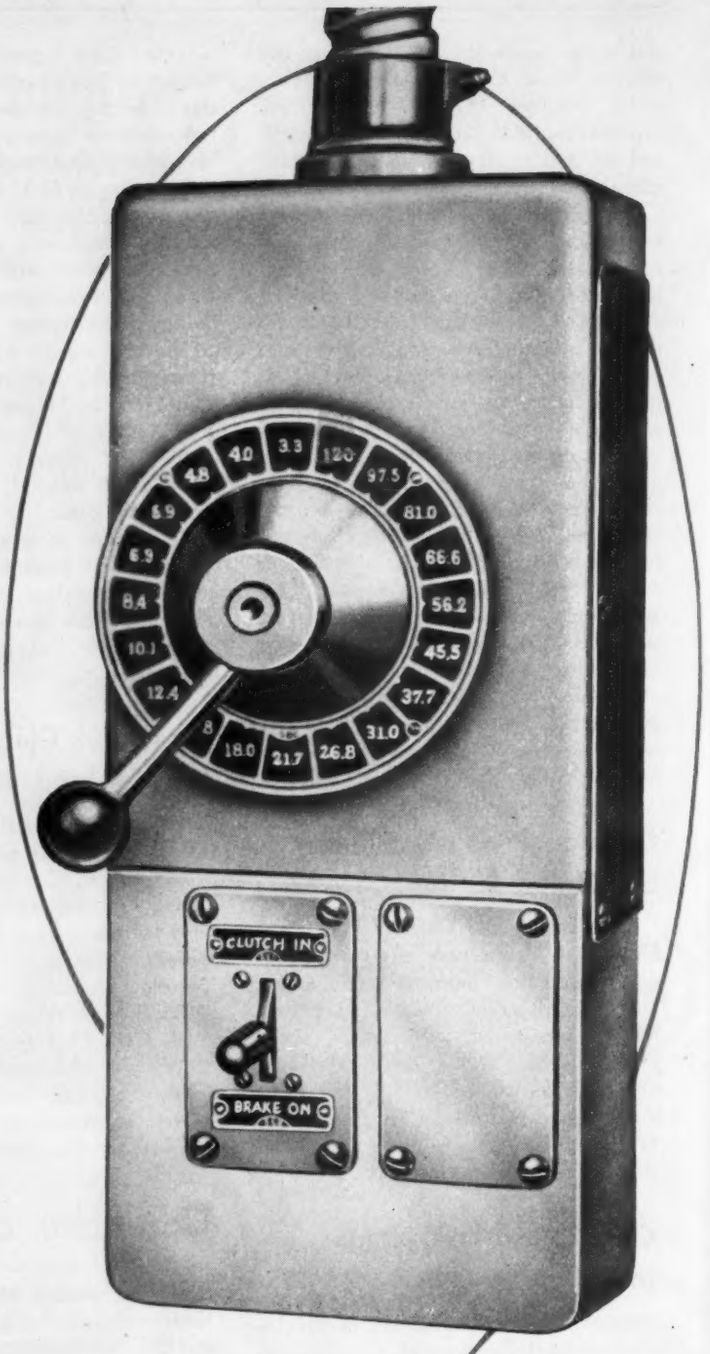
New Pendant Control with Speed Dial and Clutch-Brake Lever Located Where You Want Them

The addition of this entirely new and different Pendant Control to all Bullard Cut Master Vertical Turret Lathes provides a high degree of control and operating efficiency not found in other machine tools.

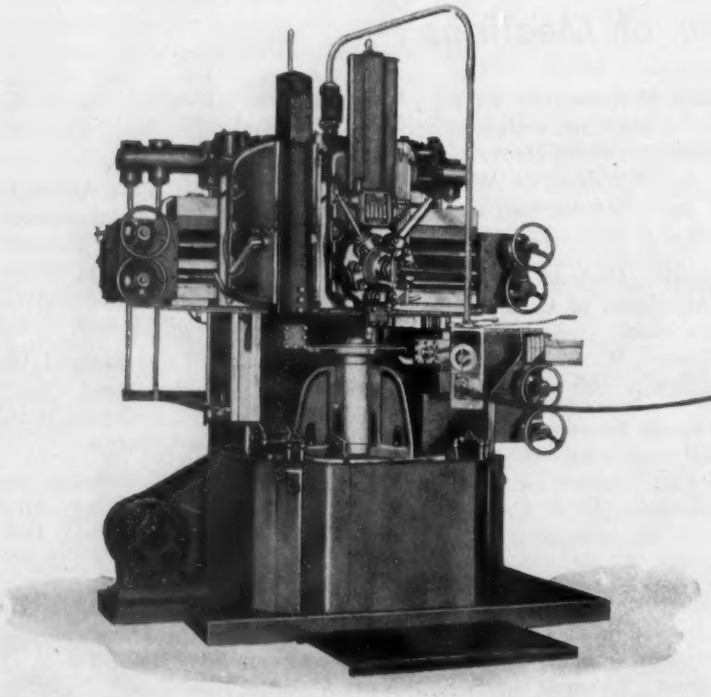
This is how the Bullard Pendant Control works. With the machine operating and a speed change needed, you throw the switch lever to "BRAKE ON" . . . rapidly dial the new speed (an exclusive Bullard Pendant Control feature) . . . throw the lever to "CLUTCH IN". That's all! . . . gears are quietly and almost instantaneously shifted through electrically-controlled, hydraulically-operated mechanisms. When you want to jog the table any fraction of a revolution for positioning or indicating, you merely manipulate the single switch lever.

This new Pendant Control is suspended at the most convenient operating height. It swings in an arc to whatever position is required for ease of operation.

For facts about other features that make Bullard Cut Masters your best investment *for cutting time on and between cuts*, write for Bulletin CVTL-4-1, today. The Bullard Company, Bridgeport 2, Connecticut.



This unique Pendant Control is now a standard specification on all Bullard Cut Master Vertical Turret Lathes which are available in 30" and 36" sizes with two heads . . . in 42", 54", 64" and 74" sizes with two or three heads.



BULLARD

CREATES *NEW METHODS*

TO MAKE MACHINES DO MORE

mirrors of MOTORDOM

By A. H. ALLEN *Detroit Editor, STEEL*

Outlook for truck production much brighter than for passenger cars. Builders aiming at or beyond goal of 1,000,000 units in 1946. Price picture brighter than for automobiles; substantial increases granted during war to some manufacturers

DETROIT

WITH the outlook gloomier day by day for any substantial measure of passenger car production in the first half of the year, and with prospects for high overhead costs enforcing losses on all cars which can be produced, attention is focusing on the possibilities in the truck field. Market for new trucks and commercial vehicles is considered by many to be almost limitless for the next couple of years, and while a lot of cold water has been dashed on estimates projecting assembly of 1,000,000 such vehicles during 1946, certainly the planning and scheduling of production facilities by all truck builders is aiming at this figure if not well beyond it.

The price picture in trucks is not so dark as in passenger cars, since during the war years OPA permitted substantial price increases to a number of builders, estimated to range 20 per cent and upward. Strong pressure from the Office of Defense Transportation also led to price revisions, and even though the OPA on occasion has threatened to rescind such increases eventually, this has not been done as yet and does not appear likely in view of current conditions and pricing tendencies.

Truck Producers

The big five of the truck field are Chevrolet, Ford, International Harvester, Dodge and General Motors Truck & Coach. Between them they could probably account for output of well over 100,000 units monthly, to which must be added the smaller output of Reo, Mack, White, Diamond T, Federal, Studebaker, Willys, Autocar, Brockway, Sterling, Divco, Four Wheel Drive, Marmon-Herrington and others. In addition there have been frequent reports of Packard, Nash, Plymouth and Hudson planning entries in the commercial car and pickup truck market.

As far as materials and parts procurement are concerned, truck builders are in a little better position, since they do not require the great diversity of parts and trim required by passenger cars. Against this, however, must be weighed the restraining influence of the retention of price ceilings on truck parts which, despite what any bureaucrat will tell you, simply means primarily ceilings on production and profits of parts suppliers, secondarily control of prices. Vastly expanded facilities for production of military truck components should be readily adaptable to output of similar requirements of commercial units.

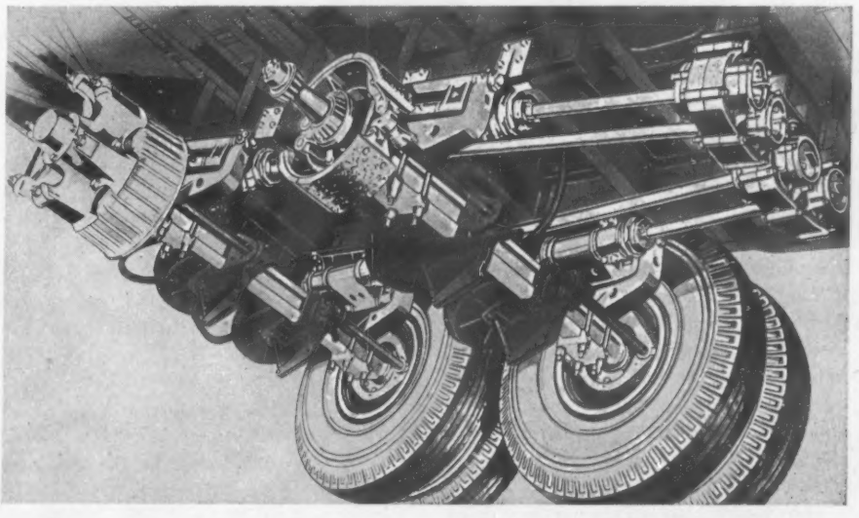
It seems entirely likely builders will throw every effort behind pushing up truck production schedules, even at the sacrifice of some passenger car assemblies if necessary.

Novel form of spring suspension for heavy-duty vehicles, adopted as standard equipment on the entire line of tandem-axle trailers built by Fruehauf Trailer Co., involves the use of heat-treated alloy steel torsion bars. Known as a gravity suspension system, it has been under test for nearly two years, and is based on the principle of leverage. Spring action is achieved through the twisting action of torsion bar arms acting upon longitudinal torsion bar springs fixed in shackles at one end and terminating in gear boxes forward of the front tandem axle, as shown in the accompanying illustration.

The torsion bar spring yields in proportion to the load applied, so as the load increases and the twisting force applied by the torsion bar lever increases, the spring provides increasing resistance. However, increasing loads shorten the leverage of the arm, so that regardless of the load applied—either from payload or road shock—it is impossible to "bottom" or reach the limit of spring action.

The two gear boxes each contain a pair of one-to-one load equalizing gears. They function as torque dividers so as to load each torsion bar equally regardless of the movement of wheels on each side with respec to one another. Thus, if one wheel deflects while the other is level, part of the torque on the one torsion bar will be transferred to the mating torsion bar to equalize their loading.

The new tandem system has a net payload capacity of 33,000 pounds, with no appreciable difference in weight between the new models and comparable units with standard suspensions. Claimed advantages include increased tire life, im-



Cutaway view of the new Fruehauf suspension tandem. Suspension consists of longitudinal torsion bar springs, fixed in shackles at one end and terminating in gear boxes forward of the front axle. Axes of the shackles and torsion bar springs are inclined toward the center of the chassis, imparting self-steering ability to rear wheels. Torsion bar springs are alloy steel, magna-fluxed to eliminate flaws. Bearings are self-lubricated and sealed for life

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NEW CHRYSLER: The "Royal" 6-passenger, 4-door sedan, shown above, is one of six models embracing a total of 26 body styles, offered by Chrysler in 1946. The "Royal" is powered by a 6-cylinder engine

proved level ride, reduction in maintenance costs, greater load stability, greater safety due to reduction of rollover hazard, and easier handling.

With gravity suspension, axles have freedom of movement completely independent of the frame and body. The entire load is suspended on the shackles, permitting the cushioning of road shock both in lateral and vertical directions. The tandem arrangement has the ability to "lean in" on turns, thus counteracting the normal action of centrifugal force which tends to tip vehicles with conventional type springs. The new suspension aligns the wheels, axles and body parallel to the grade on banked curves; and, since the load-carrying portion of the vehicle is suspended by gravity, it is self-leveling on the straightaway.

This freedom or lateral float of the tandem axles permits automatic steering or trailing of the axles on turns of 240 ft radius or greater, minimizing tire scuffing and reducing the pulling effort required on curves as well as on the straightaway.

Another feature is that no brake torque loading or horizontal road shocks are transferred to the torsion bar springs. Instead, the resulting reactions are transferred directly to the chassis from each wheel independent of the other and independent of the spring suspension. This eliminates wheel chatter and tire hop, common to ordinary tandems.

The torsion bar mounting has been designed so as to make it a matter of minutes for a complete replacement or for resetting to meet special operating conditions. By removing the outer cover, it is possible to slide out the torsion bar without difficulty. Similarly, the spring length on either side of the trailer can be adjusted independently to accommodate eccentric load conditions or for continuous operation on highly crowned roads. It is not believed likely much servicing will be required of the system, but should a torsion bar happen to take a permanent set for one reason or another a simple adjustment brings it back to proper alignment.

Charging Economic Stabilizer Bowles with either ignorance of certain facts or unwillingness to reveal them publicly, Henry Ford II again set the wires humming with a detailed refutation of Bowles' earlier insinuations about the Ford Motor Co.'s alleged "outrageous" actions in regard to prices. Mr. Ford pointed out his application to OPA was made last July 20 before V-J Day and at a time when a wartime quota of 39,910 units had been assigned to Ford for the balance of 1945. The company decided that of this total 32,750 would be Ford models, the balance Mercury and Lincoln. This limitation on quantity fixed the estimated manufacturing cost at $991, to which was added a 5 per cent profit and the usual dealer markup, giving an indicated retail sales price of $1388, or 55 per cent more than the previous peacetime selling price of $895.

Actually this action had nothing at all to do with peacetime price ceilings, but it certainly does attest to the accuracy of estimates on cost, since it was ultimately possible to build only 34,439 cars in 1945, and the cost figured almost to the penny the earlier estimates. Obviously, says Ford, you cannot make 39,910 cars in six months in a plant designed to build more than 100,000 every month without greatly increasing unit costs. As Ford so adamantly maintains, "Our one aim has been to get into maximum production as quickly as possible. We have spared no costs. We have paid higher prices for materials, we have used propane gas when we could not get coal, we agreed to add $41 million to our annual bill for labor . . . but our assembly lines have run by fits and starts because we could not get parts and materials . . . Have no fear that Ford will charge the American people one penny more than it has to for cars . . . To meet competition we are now selling one of our truck models at $100 below OPA ceilings . . . We would like to sell all cars below price ceilings, not above. But low costs and low prices depend on large-scale production. That, in turn, depends upon an uninterrupted flow of parts and materials to our assembly lines. When you say, Mr. Bowles, that only from 10 to 25 per cent of our parts are under OPA price control you miss the point. Shortage on only a few parts can stop the whole assembly line. This, in fact, is what has happened time and again."

Macauley Resigns as AMA President

For nearly two-score years, Alvan Macauley, chairman of the board of Packard, has held the post of president of the Automobile Manufacturers Association and its wartime counterpart, the Automotive Council for War Production. Few automotive executives are better known or better liked. He is frequently introduced to audiences as "Mr. Detroit." He is now resigning, effective with the selection of a successor, to be determined at an early meeting of the AMA directors. However, the sudden impact of his announced retirement has made the selection of a new president not the easiest of tasks.

Speculation is heard to the effect the new president likely will be an official of one of the independent manufacturers again, and this at once brings up the name of Paul Hoffman, president of Studebaker, who has returned to his office there after yeoman service as head of the Committee for Economic Development.

Publicity and photographs finally have been released on 1946 Chrysler models and reveal a rather completely redesigned front end and grille, with front fenders flowing into the body and rear fender skirts lengthened to cover more of the wheel. The full line of cars comprises three 6-cylinder types and three 8-cylinder designs, in 25 body styles and an option of 13 colors. Wheel diameter has been reduced to 15 in. and rims widened to give a better grip on the synthetic rubber tires, tending to reduce operating temperatures.

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VICKERS

Variable Delivery PISTON TYPE PUMPS

Among the features indicated below are many of the reasons for the high overall mechanical efficiency and the high volumetric efficiency of Vickers Variable Delivery Piston Type Pumps. Also, the inertia forces of the rotating parts are minimized . . . the cylinders are arranged axially permitting more compact design.

Write for new Bulletin 43-11 which includes description of construction, operation and types of controls, installation drawings, performance characteristics, installation and operating instructions of Vickers Variable Delivery Piston Type Pumps.

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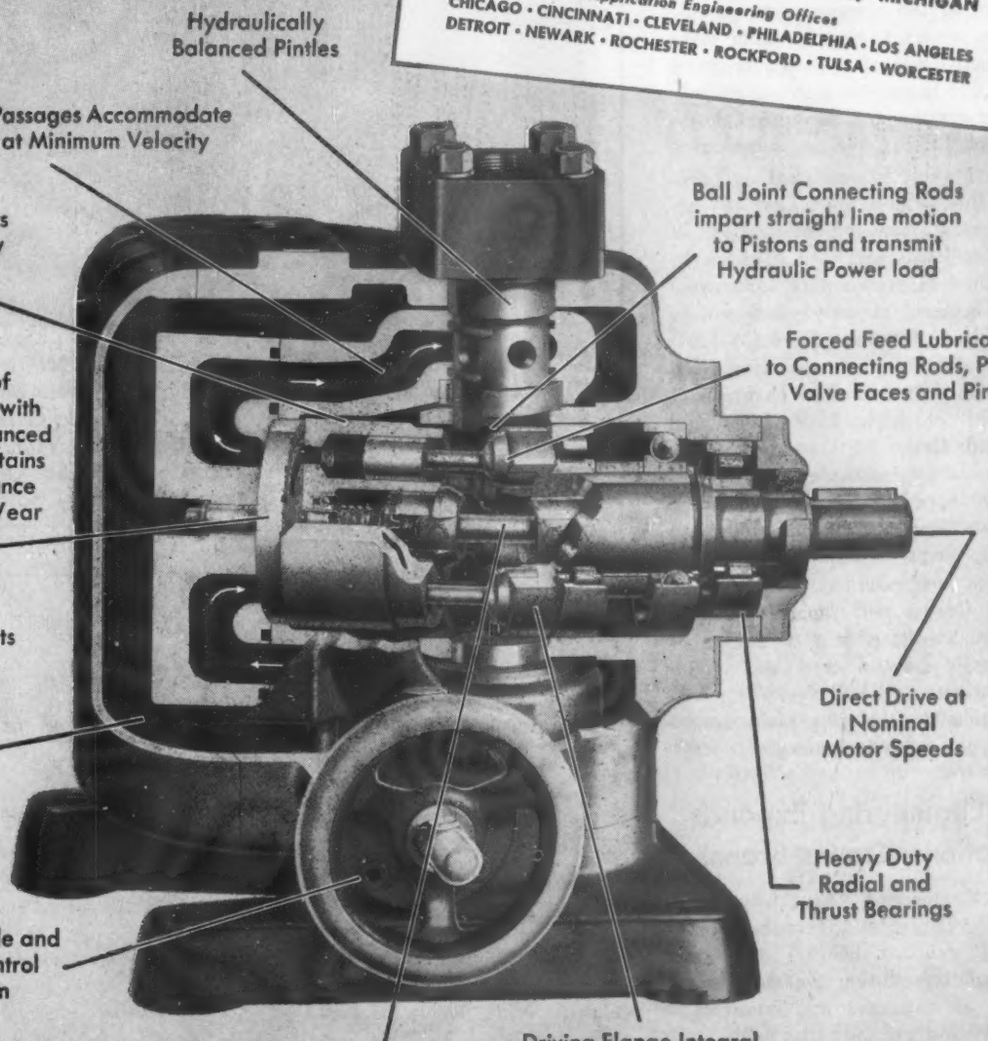
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There Are More Than 5,000 Standardized VICKERS Units For Every Hydraulic Power and Control Function

Lukens Steel Promotes Four Officers

Subsidiaries' officers take new executive positions in parent company. President and superintendent advanced

CHANGES in management of Lukens Steel Co., Coatesville, Pa., and its subsidiaries, By-Products Steel Corp. and Lukenweld Inc., were announced last week by Robert W. Wolcott, Lukens' president. The changes are in line with the desire of the companies to provide maximum service to customers, to make most effective use of various fabricating facilities and to provide a strong co-ordinated organization for the further development of Lukens and its subsidiaries.

R. W. Moffett has resigned as president of By-Products Steel Corp. to become general manager, fabrication, of Lukens Steel Co., and C. L. Huston Jr. has resigned as president of Lukenweld Inc. to become executive assistant to the president of Lukens Steel Co.

Robert W. Wolcott also has been elected president as well as chairman of the board of both By-Products and Lukenweld. Lester M. Curtiss, who has been general superintendent of Lukens, has been appointed general manager, steel plants (open hearth, plate mills, and supporting shops) of Lukens Steel Co.

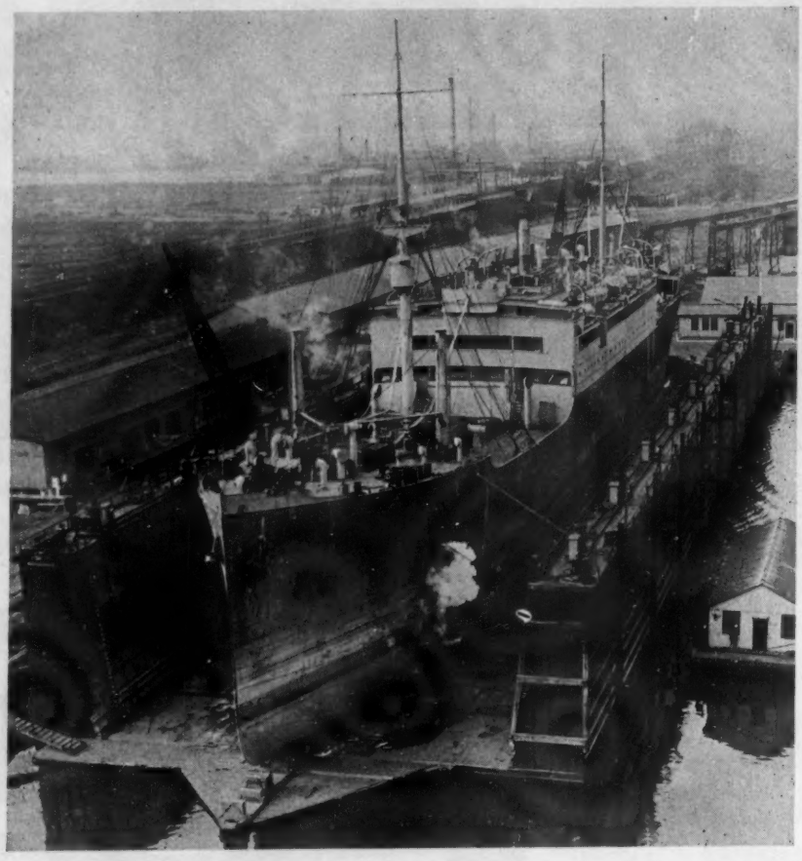
In their new positions, Messrs. Moffett and Curtiss will report to G. D. Spackman, vice president in charge of operations of Lukens Steel Co.

C. L. Huston Jr. will devote his major attention to developing plans for the future of the three companies.

Luria Engineering Expands Operations; Opens Branch

Luria Engineering Corp. whose personnel developed and furnished many types of standard hangars and other utility buildings during the war is now engaged as engineers and constructors in the aviation and industrial fields.

In addition to the division offices in Chicago, a New York office has been established at 500 Fifth Ave. Officers of the company are: Herbert B. Luria, president; B. H. Tripp, executive vice president; P. A. Strobel, vice president and director of engineering; R. L. Hedlander, sales manager; and Major Victor T. Nydele, division manager.



SURVIVES TWO WARS: The Brazilian *S. S. POCONE* is being repaired in U. S. Steel's Federal shipyard at Kearny, N. J., after being salvaged from the bottom of New York harbor. Built in Vegesack, Germany, in 1908, the liner was seized by Brazil during the first World War. In 1941, she was scuttled in New York harbor to douse a fire in her coal bunkers. After being rehabilitated, the ship is expected to carry passengers and cargo between the Americas

BRIEFS . . . .

Paragraph mentions of developments of interest and significance within the metalworking industry

Reliance Electric & Engineering Co., Cleveland, has authorized a recapitalization plan which will provide approximately $1.5 million of additional working capital.

—o—

Tonawanda Electric Steel Casting Corp., North Tonawanda, N. Y., has been purchased by three men formerly associated with American Radiator & Standard Sanitary Corp. in Buffalo—Joseph Sanders, Albert Carter and Charles A. Linburg.

—o—

United States Steel Corp., New York, has announced that more than one and one-half million people saw its motion pictures last year. These films—"Behind the Annual Report," "Help Yourself Beat the Heat," and "Steel, Man's Servant"—are still available without cost to interested groups.

—o—

Weiger Weed & Co., Detroit, has been formed to specialize in resistance welding electrodes, electrical contacts and special metallurgical products. The company is located at 11644 Cloverdale Ave., Detroit.

—o—

Continental Can Co., New York, has acquired Fibre Can Machinery Corp., Rutland, Vt.

—o—

Greenfield Tap & Die Corp., Greenfield, Mass., has plans to close its spe-

cial tap plant, located in Detroit, and will move the equipment to Greenfield where purchase of a government-owned gage plant is being negotiated.

—o—

Pittsburgh Steel Co., Pittsburgh, has opened sales offices in the Broad Street Station Bldg., Philadelphia, and at 101 Marietta Street Bldg., Atlanta.

—o—

Earle M. Jorgensen Co., Houston, Tex., steel distributor, has announced plans for a $250,000 building program which will double its warehouse capacity.

—o—

Barium Steel Corp., Canton, O., has acquired control of Republic Industries Inc., New York, and has taken control of the following companies through the acquisition: Jacobs Aircraft Engine, Pottstown, Pa.; Kermath Mfg. Co., Detroit; Geometric Stamping Co., Cleveland; and Porcelain Steels Co., Cleveland.

—o—

Society for the Advancement of Management, Chicago Chapter, Chicago, has made available copies of the film "The Original Films of Frank B. Gilbreth," showing applications of the principles of motion study.

—o—

Sterling Steel Products Co., Baltimore, has moved from 56 West Biddle St. to 2101 Washington Blvd., that city.

—o—

Bauer-Wilson & Bateman, Chicago, pig iron, ferroalloys and fluorspar dealers, have moved their offices from 310 South Michigan Ave. to 134 South LaSalle St., that city.

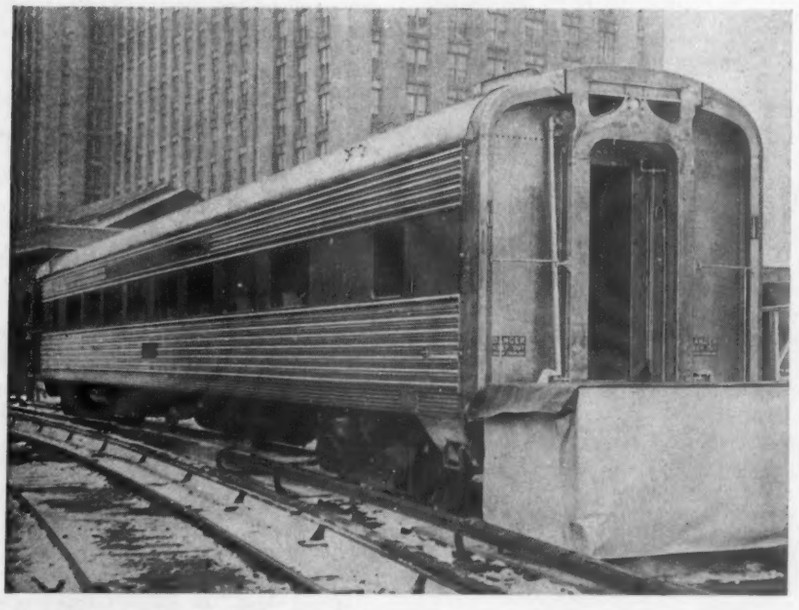
Sharon Steel Corp. Leases By-Products Coke Plant

Important new facilities have been added to Sharon Steel Corp.'s equipment through acquisition of a by-product plant located in the heart of the coal fields at Morgantown, W. Va. This property has been leased from the government for five years and will be operated to supply coke to the two 800-ton blast furnaces at the company's Farrell, Pa., works.

The coke works with its 74 Wilputte ovens and 400,000 tons annual output contains all the necessary auxiliary equipment for production of blast furnace coke and various by-products from coke gas. The ovens were built in 1941-42 and were operated during the war as an adjunct to the large chemical works at Morgantown.

In making the announcement, Henry A. Roemer, president, Sharon Steel Corp., stated that the acquisition of this property and certain important contracts for raw materials would make Sharon Steel Corp. a fully integrated unit and greatly strengthen the company's position.

The terms of the lease were not made public but it is understood that the rental charge amounts to $230,000 annually. The plant will be manned by men formerly employed there and will be in charge of W. T. Woodman who has been located on the property since 1941.



STAINLESS STREAMLINER: This is the first of 720 stainless streamlined coaches that will be placed in service by the New York Central system. This particular coach is being demonstrated in Detroit before being added to the Empire State Express. NEA photo

Warner&Swasey Enlarging Its Production Line

Long-established Cleveland tool interest adding variety of new products. Plans to keep enlarged facilities engaged

WARNER & Swasey Co., Cleveland, intends to operate all of its expanded facilities for peacetime production, adding a variety of new products to supplement turret lathes which have been its standard product for 66 years, Charles J. Stilwell, president, stated last week in a letter to stockholders.

"We ended the war with a plant capacity approximately double that required for turret lathe demand then," he said.

"Two courses of action were possible. We could dispose of our DPC-owned facilities, plus a portion of the expanded facilities owned by the company, and shrink our operations to the size required for the manufacture of turret lathes; or we could add new products, in both the machine tool and allied fields, to the extent required to insure utilization of all of our expanded facilities and skills resulting from the war effort.

"The latter course was the one decided upon. The company is now in the process of acquiring the Defense Plant Corp. building and such portion of leased machines and equipment as it considers desirable to retain for future operations."

Among new machine tools already added to the company's line are an electrocycle turret lathe, a precision tapping and threading machine, and a multiple-spindle automatic. Among new non-machine tool products already undertaken are a pin drafting machine used in the making of worsteds, a knitting machine for cotton and rayon yarns, and a new grading machine.

Carboloy To Center Metal Facilities in New Plant

Carboloy Co. Inc., Detroit, has completed construction of its new metal plant north of its present plant on 8-Mile road in Detroit. The new plant will be in operation as soon as necessary equipment has been installed.

Removal of all metal-producing facilities from the original plant to the new one will provide more efficient, lower-cost mass production of carbide products generally, according to Carboloy officials.

Price Relief Pleas Expected To Flood OPA Pacific Coast Offices

Manufacturers temporarily delaying applications pending clarification of wage issue. Hundreds of plants in area awaiting settlement of machinists' strike, which began Oct. 29, before actively moving for relief

SAN FRANCISCO

FLOOD of applications for price increases from manufacturers in northern California is expected by regional offices of the Office of Price Administration here within a few weeks.

Until now, however, industry's interest has been confined chiefly to inquiries as to procedure in filing applications and general regulations regarding price action.

OPA officials believe the major reason for tardiness in filing requests for increases is caused by the machinists' strike which has tied up more than 200 San Francisco area manufacturing plants since Oct. 29, and has affected several score others indirectly.

It is pointed out that manufacturers are unlikely to take much interest in specific price boosts as long as their wage question is unsettled. Signing of an agreement with the machinists on wages, however, will allow formulation of wage-price ratios in each company and the result is likely to be an avalanche of applications.

OPA officials here are grateful for this respite. They report procedural rules have been slow in coming out of Washington, and, in fact, a number of basic methods still remain to be clarified.

However, when a definite program has been established, OPA believes it will be able to handle cases in an average of about a month's time. Prospects now are that most of the cases which will reach the district offices will be those of small companies. Large, integrated firms, it is pointed out, probably will carry their applications direct to Washington.

Meanwhile, an indication that labor's tension has not been completely dispelled by the recent settlement of the national steel strike was demonstrated here when 2600 workers of Columbia Steel Co. (a U. S. Steel Corp. subsidiary) walked out of the Pittsburg, Calif., plant on Feb. 22 and remained on strike for two days.

The union charged that the company had instituted a "speed-up" following settlement of the national strike. The company, on the other hand, claimed that no grievance had been filed prior to the walkout, contrary to terms of the agreement with the union, and that the union had violated its "no strike" clause.

Workers began returning to the mill Monday, Feb. 25, after an agreement had been negotiated providing for the same working conditions that existed before the national strike was called. This eliminates staggered shifts and reassignment of utility workers on the open-hearth furnaces.

Columbia officials, who had hoped to have at least two or three of the plant's eight open hearths in operation by Feb. 23, end of the first week of operation following settlement of the national strike, said that the latest walkout would mean a further delay of a week or ten days in resuming full operations.

Continued increases in unemployment were reported in California during January, the state department of employment reported.

The department said "there are large surpluses of unskilled and production workers" although a "sizable unsatisfied demand exists for specialized types of skilled workers." Well qualified clerical workers were reported to be particularly in demand.

The department received 97,020 applications for unemployment insurance during January and an average of 200,073 persons were receiving benefit checks or were waiting on them during the month.

Strikes in January, and the uncertainties they have cast on the immediate future of industry, are believed to have been directly responsible for a reduction in plans for industrial plant expansion filed in January in the San Francisco area. For that month, according to San Francisco Chamber of Commerce data, there were 44 plans filed for $2,631,000 in new ventures, while expansions of 34 existing plants at a cost of $2,831,000 were listed. The total of the two at about $5.5 million is approximately half of the monthly average rate during much of 1945.

Gold Mining Operators Seek War Damage Relief

SAN FRANCISCO

Gold mine operators in California are giving strong backing to legislation now before the House of Representatives which would pay miners for damages incurred by the WPB order closing mines during the war.

In view of the strong opposition of administration spokesmen to the bill, the measure is given only slight chance of passage.

Probably the strongest opposition to the legislation lies in the fact that if gold mines were singled out for favorable treatment, it would be necessary to give relief to every other industry which might have a claim for damages to its property, or disruption of its business by war emergency orders.

Two Government-Owned Aluminum Plants Are Leased by Kaiser

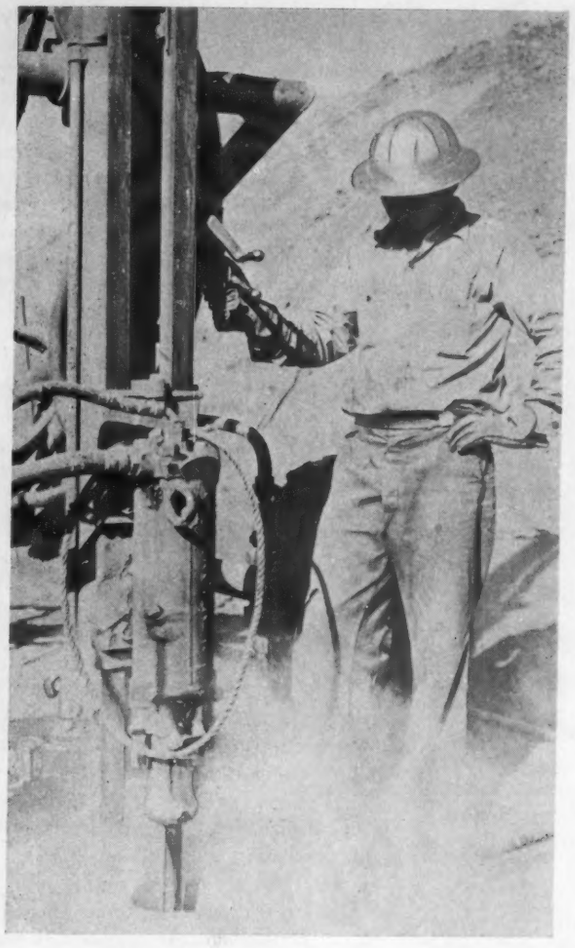
THE WAR Assets Corp. last week leased two government-owned aluminum plants at Spokane, Wash., to the Kaiser-Frazer Corp. and Kaiser Cargo Inc. subject to approval of the attorney-general.

Under the agreement, the Trentwood aluminum rolling mill will be leased to Kaiser-Frazer and the Mead aluminum reduction plant to Kaiser Cargo for five years on an annual rental basis at terms which give the two companies options to purchase.

The Reynolds Metals Co. had submitted competitive bids for both the Spokane plants.

A statement by Lt. Gen. Edmund B. Gregory, Maj. Gen. G. E. Edgerton, vice chairman, and S. H. Husbands, a member of the board of directors, War Assets Corp., said, "The Reynolds Metals Co. is already established in the aluminum industry and has already arranged with the War Assets Corp. for lease or purchase of four plants in the industry. These include the key alumina plant at Hurricane Creek, Ark., the reduction plant at Jones Mills, Ark., the aluminum rolling mill at Listerhill, Ala., and the aluminum extrusion plant at Grand Rapids, Mich. The Kaiser companies propose to enter this industry for the first time. It is therefore consistent with section 2 (b) for the War Assets Corp. to lease the two plants to the Kaiser

"The Kaiser companies propose to use



HARD-ROCK MAN: In the lingo of his buddies, this worker operating a wagon drill on the Central Valley Project in California is a "hard-rock man." He is drilling on the course of the Friant-Kern canal, one of the four main artificial waterways of the project. NEA photo

aluminum extensively in the production of automobiles. Disposal of the two plants to the Kaiser companies therefore affords an opportunity to greatly expand the markets for aluminum and to promote the ultimate disposal of other aluminum plants subject to the Surplus Property Act.

"Although the Reynolds Metals Co. has withdrawn its bids for the lease of the Chicago (McCook) aluminum rolling mill and the Troutdale aluminum reduction plant, the company is eligible to resubmit bids for these plants and to bid for any other fabricating and reduction plants subject to disposal by the War Assets Corp."

The Trentwood aluminum rolling mill was built at a cost of $47,630,000 and has a capacity of 288,000,000 pounds a year. The Mead aluminum reduction plant cost $22,270,000 and has an annual capacity of 218,784,000 pounds.

The Trentwood plant lease is for a period of five years and may be terminated by Kaiser-Frazer Corp. at the end of the first year upon 90 days' notice, or at the end of any subsequent year upon six months' prior written notice.

The Mead plant lease is for a period of five years and may be terminated by Kaiser after the end of the second year of the lease at any time upon six months' prior notice. Kaiser shall have the privilege of electing to renew the lease for an additional two years.

Rentals shall be payable monthly in advance at the following rates: $208,000 for the first year during which two potlines shall be available; $260,000 for the second year during which two potlines shall be available; $468,000 for the third year during which three potlines shall be available; $728,000 for the fourth year during which four potlines shall be available; and $1,248,000 for the fifth year and any succeeding years in which the entire plant (six potlines) shall be available.

As rapidly as possible WAC will place two potlines in operating condition. Upon request a third potline will be placed in operating condition on or before the expiration of the third year from the effective date of the lease; a fourth potline on or before the expiration of the fourth year from such date, and the remaining two potlines on or before the expiration of the fifth year from such date.

Industry Growth Unchecked in California

Considerable new industrial building projected. Formation of new companies in state record-breaking in January

INVESTMENT in new plants and factory expansions brought nearly $9,000,000 in primary capital into Los Angeles county during January.

According to a summary released by the Industrial Department, Los Angeles Chamber of Commerce, 25 new factories were established and 30 were expanded.

Investments of $4,565,000 will go into new building, while additions to existing plants will cost $4,432,000. A total of about 3500 jobs will result from operation of the new plants and another 1124 workers will be needed in the expanded industries.

A State of California report disclosed that formation of new corporations within the state broke all records for the second successive month, there being 884 corporations set up in January, 32 per cent more than the December mark. Southern California was chosen for operations by about 70 per cent of the new firms. About 98 per cent of the latter figure were located in Los Angeles county.

An added commentary on southern California expansion was made by T. W. Johnson, vice president, Security-First National Bank, in an address before the Los Angeles Credit Men's Association.

Mr. Johnson declared that Los Angeles now has 325,000 persons in all forms of manufacturing, making it the fifth largest industrial city in the nation. In 1939, the city was rated in eleventh place. He predicted that during this generation "we shall see southern California become one of the biggest industrial centers of the western hemisphere."

Douglas Plane Deliveries Total Almost $4 Million

Between Feb. 1 and 15, a total of 15 air transports valued at $3,818,000 were delivered by Douglas Aircraft Co.'s two plants at El Segundo and Santa Monica, Calif., to airlines in the United States and throughout the world.

Heading the list of foreign deliveries were three all-new 44-passenger airliners for Australian National Airways, Sabena Air Lines of Belgium, and Air France.

MEN of industry

Edward G. English has been appointed executive assistant to **H. H. Fuller,** president, Bethlehem Pacific Coast Steel Corp. Mr. English formerly was manager of commercial research and supervisor of Pacific Coast mill scheduling.

—o—

David Crawford has been named midwest district sales manager, American Welding & Mfg. Co., Warren, O. The midwest territory includes southern Ohio, Kentucky, Indiana and a portion of Illinois. Mr. Crawford formerly was with Republic Steel Corp., Cleveland.

—o—

Dr. J. Huber Wagner has been appointed chief surgeon, Carnegie-Illinois Steel Corp., Pittsburgh, succeeding **Dr. William O'Neill Sherman** who has retired following 35 years of service. **Dr. George V. Foster** succeeds Dr. Wagner as chief surgeon of the company's Pittsburgh district, and **Dr. Gilbert A. Bruecken** has been named assistant to the chief surgeon of the company.

—o—

Frank D. Evans has been appointed assistant Chicago district purchasing agent, American Steel & Wire Co., Cleveland. **I. Eugene Bowen** continues as district purchasing agent.

—o—

Walter G. Newnam has been appointed metallurgist, United States Steel Supply Co., Chicago.

—o—

Alvan Macauley, chairman of the board, Packard Motor Car Co., Detroit, has resigned as president, Automobile Manufacturers Association, Detroit, in which position he has served for the past 18 years.

—o—

Irving C. Brown has been appointed sales manager, Industrial Electronics Division, Raytheon Mfg Co., Waltham, Mass.

—o—

E. R. McClung Jr. has joined the staff of Lukenweld Inc., Coatesville, Pa., a division of Lukens Steel Co., as welding engineer.

—o—

William E. Curran, vice president in charge of all manufacturing activities of the Rheem Mfg. Co., New York, has been elected a director of the company.

—o—

Edward C. Hoenicke, general manager of the Foundry Division, Eaton Mfg. Co., Detroit, has been appointed a member of the Gray Iron Foundry Industry Advisory Committee, Army Industrial College, Washington.

—o—

Robert F. Brown, partner of Kuhn, Loeb & Co., New York, has been elected a director of Pressed Steel Car Co. Inc., filling the vacancy caused by the resignation of **Sam Laud.**

—o—

A. J. Kerr, formerly general sales manager, has been elected vice president of sales, Rockwell Mfg. Co., Pittsburgh.

—o—

Charles R. Newpher, until recently sales engineer in the Cleveland district office, Reliance Electric & Engineering Co., Cleveland, has been appointed production manager of the Ivanhoe Division. **Frank A. Yusek,** assistant superintendent, has been made factory superintendent of the same division.

—o—

A. F. Dobbrodt has been appointed special products engineer, Carboloy Co. Inc., Detroit. Mr. Dobbrodt, formerly Pittsburgh district manager, will make his headquarters in Detroit, and will head the new Special Products Division.

—o—

W. C. Swalley has been elected vice president in charge of sales, Wellman Engineering Co., Cleveland, and **A. J. Lichtinger,** vice president, has been elected a director.

—o—

Robert A. Parks has been named general sales manager, Jessop Steel Co., Washington, Pa. Mr. Parks formerly was district manager for the company in Washington, D. C.

—o—

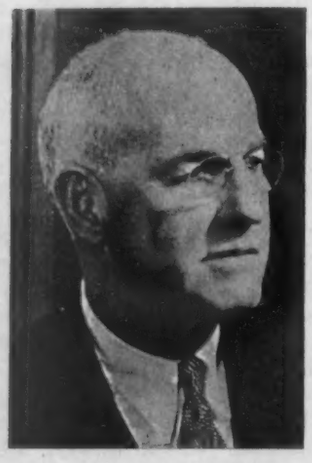
M. R. Denison has been promoted to director of purchases, Bendix Home Appliances Inc., South Bend, Ind. **Henry A. Jewell** has been named to succeed Mr. Denison as purchasing agent, and **L. F. Kedzie** has been appointed assistant purchasing agent.

—o—

Dr. Ernest J. Joss, former manager of the Des Moines, Iowa, plant, United States Rubber Co., has been named administrative assistant to **Ernest G. Brown,** vice president and general manager of the Mechanical Goods, General Products and Lastex Yarn & Rubber Thread Divisions.

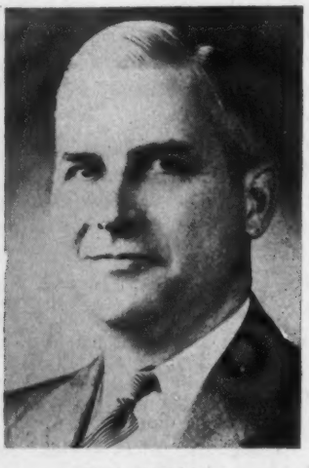
—o—

Glenn McDowell has been appointed manager of roll sales, Aetna-Standard Engineering Co., Youngstown. Mr. McDowell has been with the company since 1925, and during the war served as



ALVAN MACAULEY

CHARLES R. NEWPHER



GLENN McDOWELL

HOBART • "One of the W... Arc Welders"

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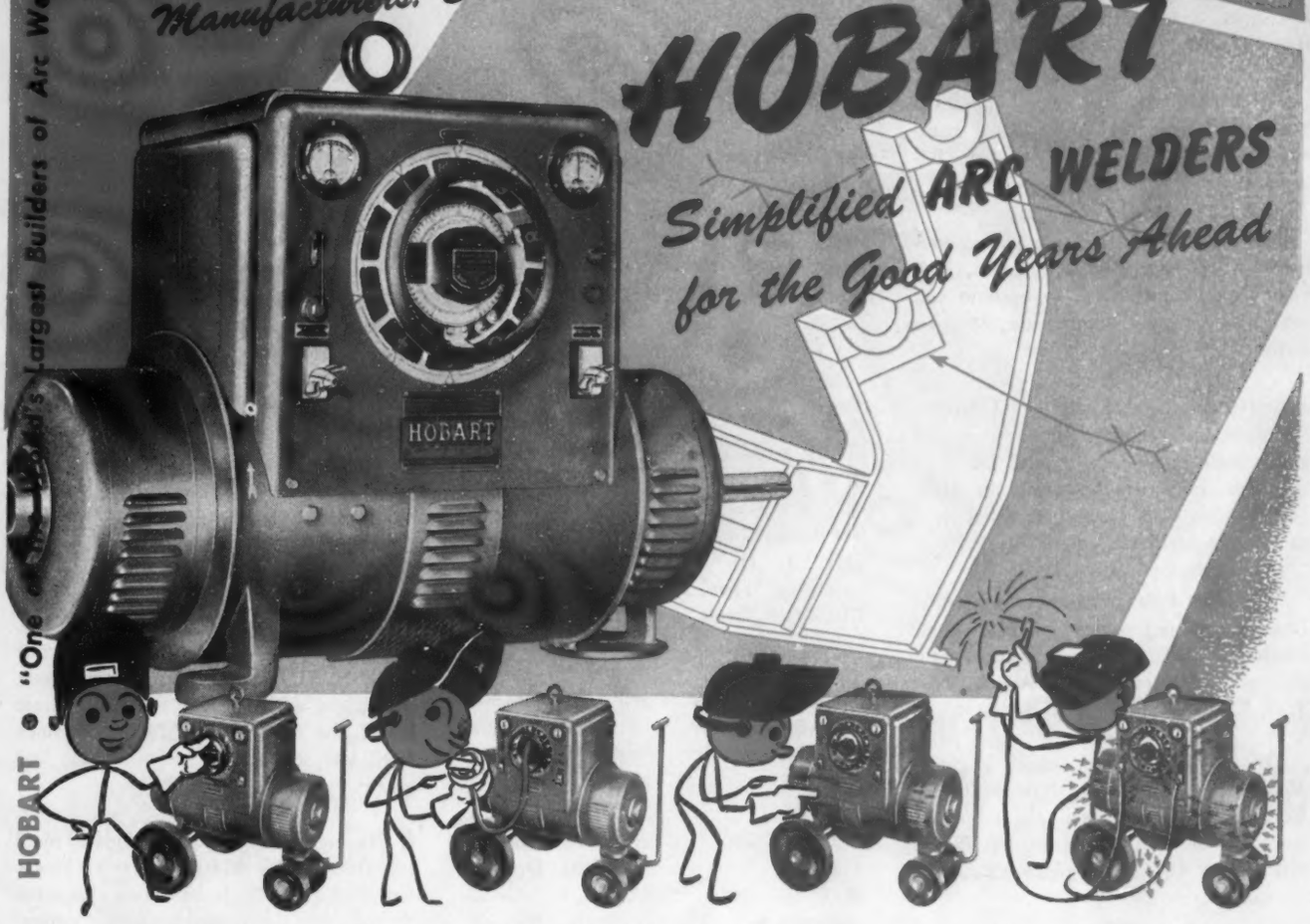

HOBART • "One ... World's Largest Builders of Arc Welders"

1000 Combinations

Multi-Range Dual Control is the exclusive Hobart feature that offers the operator a choice of 1000 combinations of voltage and amperage without a single "dead spot" in the entire welding range. With such fine adjustment of welding current instantly available, it's easy for the operator to select the exact heat which is required for every present-day electrode.

Exclusive Remote Control

This is the Hobart feature that allows the operator to make adjustments of welding current at the work, regardless of how far it may be from the welder. It improves the quality of the weld by eliminating the temptation to "get by" with improper arc adjustments to save trips back to the machine. Remote control increases your welding quality, speeds up work.

Liberal Design

A notable advantage of Hobart Arc Welders is the liberal design and conservative rating. This means that you receive more than mere claims — because the real "maximum" rating is actually far greater than its listed rating. Hobart's liberal use of copper and elimination of all cast iron parts reduces excessive weight and guarantees longer operating life.

Cooler Operation

Hobart's Two-Way Ventilation assures a cooler operating welder and longer, trouble-free service. With the Two-Way Ventilation, air is drawn in at each end and expelled at the center, providing plenty of fresh, cool air. Liberal use of copper is also a great contribution in keeping welder cool, allowing continuous trouble-free welding, even on double shifts.

A Better Rod for Every Purpose

Hobart laboratories make rods for each specific job. It is tested—improved — perfected — order Hobart Electrodes and you'll understand why they're the choice of those who want quality. Write for your price list.

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assistant to the vice president as expediter and co-ordinator of production. **William D. Todd** has been appointed assistant to the president. Mr. Todd, following service as a member of the Harriman mission in London, was director of the Steel Division, WPB.

—o—

Ira R. Ogilvie has been appointed sales promotion and advertising manager, George Gorton Machine Co., Racine, Wis.

—o—

Paul K. Povlsen has resigned as vice president in charge of production, J. I. Case Co., Racine, Wis., to become vice president and general manager, Maguire Industries Inc.

—o—

Robert W. Ritchie has joined Bliss & Laughlin Inc., Harvey, Ill., as metallurgical engineer. Since graduation from the University of Wisconsin in 1936, Mr. Ritchie has been connected with the Carnegie-Illinois Steel Corp.

—o—

Nelson F. Wilmot has been appointed Chicago district sales manager, and **Merle S. Clark**, St. Louis district sales manager, Mathieson Alkali Works, New York.

—o—

Dr. L. A. Philipp, chief engineer, Kelvinator Division, Nash-Kelvinator Corp., Detroit, has been elected a vice president of the corporation. Dr. Philipp will be in charge of engineering, Kelvinator Division.

—o—

Victor E. Bertrandias, director of foreign sales and **Nat Paschall**, director of domestic commercial sales, recently were named vice presidents of the Douglas Aircraft Co., Santa Monica, Calif.

—o—

E. R. Galvin, formerly president, Tyson Bearing Corp., Massillon, O., has been named executive vice president, general sales manager and member of the board, LaPlant-Choate Mfg. Co. Inc., Cedar Rapids, Iowa. **S. L. Myers**, vice president and general sales manager during the past year, has become vice president and export sales manager; **Jay M. Fetters**, former export manager has been named manager of foreign development.

—o—

Walter Geist, president, Allis-Chalmers Mfg. Co., Milwaukee, and **J. P. Spang Jr.**, president, Gillette Safety Razor Co., South Boston, Mass., recently were named regional vice presidents of the National Association of Manufacturers.

—o—

Simonds Worden White Co., Dayton, O., has elected the following officers: **F. R. Henry**, chairman; **H. R. Simonds**, president, treasurer and general manager; **R. N. Carr**, first vice president; **M. H. Riber**, second vice president. **N. G. Johnson** has been promoted to general sales manager; **J. H. Allison**, sales manager, Grinding Wheel Division; and **H. D. Blackburn**, sales manager, Knife Division.

—o—

Col. Harold A. Tenney has returned from 5 years' service with the Army to the National Iron Works, San Diego, Calif., as assistant comptroller.

—o—

J. E. Gulick has been named general manager, Tire Manufacturing Division, B. F. Goodrich Co., Akron. Mr. Gulick succeeds **A. W. Phillips** who has resigned.

—o—

Dr. Frederick Port, who served during the war with the Army Ordnance Department in procurement work, has joined Cribben & Sexton Co., Chicago, and has been named chief engineer.

—o—

W. J. Allard has been appointed chief chassis engineer of Kaiser-Frazer Corp., Willow Run, Mich. He was with Ford Motor Co. for more than 15 years as a chassis engineer and was in charge of many phases of chassis development work on Ford and Mercury passenger cars and the Ferguson tractor.

—o—

R. P. Kytle Jr. has been appointed manager of planning, Reynolds Alloys Co., with headquarters at Listerhill, Ala.

—o—

Allen D. Pettee has been appointed chief electrical engineer, General Cable Corp., New York.

—o—

A. J. Cayia has been appointed vice president and general manager, Inland Lime & Stone Co., subsidiary of Inland Steel Co. His headquarters will be at Manistique, Mich.

—o—

Emery B. Gebert has joined the Hungerford Research Corp., Murray Hill, N. J., as chief powder metallurgist. Mr. Gebert formerly was metallurgist, Koebel Diamond Tool Co., Detroit.

—o—

Russell W. Boettiger has been appointed sales manager, Leslie Co., Lyndhurst, N. J., manufacturer of regulators, controllers and whistles. Mr. Boettiger joined the company in 1936 and since 1942 has served as chief planning engineer.

—o—

Grover C. Schantz, previously plant superintendent, Metalwash Machinery Co., Irvington, N. J., has been appointed production superintendent, Optimus Equipment Co., Matawan, N. J.

—o—

John F. Wilkes has been appointed technical director, railroad department, Dearborn Chemical Co., Chicago.

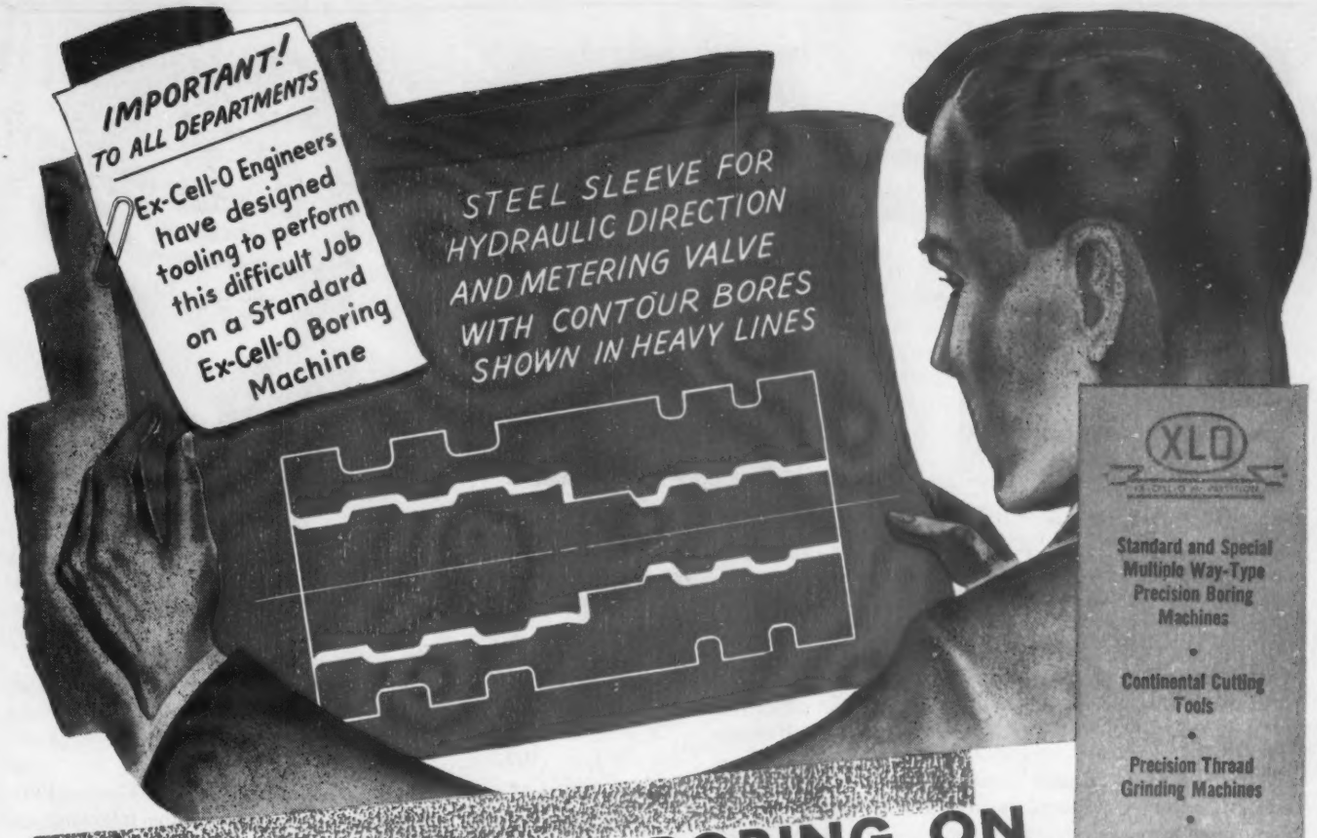
—o—

T. W. Gibb, with the Steel City Electric Co., Pittsburgh, 20 years, has been elected president. Mr. Gibb succeeds

E. R. GALVIN

W. J. ALLARD

T. W. GIBB


IMPORTANT!
TO ALL DEPARTMENTS
Ex-Cell-O Engineers have designed tooling to perform this difficult Job on a Standard Ex-Cell-O Boring Machine
STEEL SLEEVE FOR HYDRAULIC DIRECTION AND METERING VALVE WITH CONTOUR BORES SHOWN IN HEAVY LINES

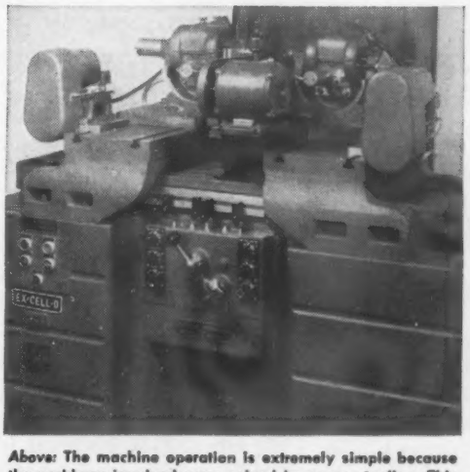
STEPPED CONTOUR BORING ON STANDARD EX-CELL-O MACHINE

Gives You the Economy and Versatility of a Standard Machine with the Efficiency and Low Unit Cost of a Special

Stepped contour bores at both ends of a small steel sleeve for a hydraulic direction and metering valve were to be held concentric within .0002″ and concentric with the O.D. within .0005″. The problem was solved by using a standard Ex-Cell-O Precision Boring Machine with a specially designed collet which holds the part without distortion, and with two special contour boring devices.

These boring devices, adaptations of the Ex-Cell-O Universal Cam Type Dresser, were used to actuate the tools for the stepped contour bores at both ends within the prescribed limits. The simple machine cycle makes operation easy.

You may not have a problem exactly like the one for which this Ex-Cell-O standard precision boring machine and special tooling were used. Whatever your production problem is, Ex-Cell-O engineers are glad to offer you their years of precision machining experience. Contact your nearest Ex-Cell-O representative, or write direct to Ex-Cell-O at Detroit.



Above: **The machine operation is extremely simple because the problems involved were solved by proper tooling. This standard Ex-Cell-O Style 1212-A Precision Boring Machine with special tooling was used for this unusual application.**

EX-CELL-O CORPORATION, DETROIT 6

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Standard and Special Multiple Way-Type Precision Boring Machines

•

Continental Cutting Tools

•

Precision Thread Grinding Machines

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Precision Lapping Machines

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Broaches and Broach Sharpening Machines

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Multiple Drilling and Other Special Purpose Machines

•

Tool Grinders

•

Hydraulic Power Units

•

Grinding Spindles

•

Drill Jig Bushings

•

Aircraft and Miscellaneous Production Parts

•

Fuel Injection Equipment

•

R. R. Pins and Bushings

•

Pure-Pak Paper Milk Bottle Machines

See Ex-Cell-O Exhibit at ASTE New Era Exposition Cleveland, April 8-12 Booth No. 1437

J. E. NYHAN

Who resigned from the staff of National Founders Association to rejoin the National Metal Trades Association, noted in STEEL, Feb. 25 issue, p. 83.

CRESTON E. KITE

Who has been appointed assistant to the president, General Alloys Co., Boston, noted in STEEL, Feb. 18 issue, p. 89.

WILMOT F. WHEELER

Who has been elected president, American Chain & Cable Co. Inc., Bridgeport, Conn., noted in STEEL, Feb. 25 issue, p. 78.

W. I. Patterson who has retired from that position and has been elected chairman of the board.

—o—

William Van C. Brandt recently resumed his former position as manager, Exide motive power sales, Electric Storage Battery Co., Philadelphia, having served with the Navy during the war.

—o—

Stewart E. Lauer, president, York Corp., York, Pa., a member of the American Society of Refrigerating Engineers for 30 years, recently was awarded a life membership by that organization.

—o—

Eli Mullin, attorney and consulting engineer, Chicago, has established his own office in the Hyde Park Bank Bldg., and will engage in the practice of patent, trademark and copyright law. Until recently he was associated with Carnegie-Illinois Steel Corp. as a production control metallurgist.

—o—

George L. Collord, vice president and director, Shenango Furnace Co., Pittsburgh, retired Feb. 8. During his service with the company he was superintendent of blast furnaces, general manager of operations and vice president.

—o—

Capt. R. E. Jones, until recently executive officer of the Shore Division, Bureau of Ships, has been appointed assistant general manager of the Blaw-Knox Division, Blaw-Knox Co., Pittsburgh.

—o—

Westinghouse Electric Corp., Pittsburgh, has announced the following appointments: **John K. Hodnette,** manager of the Transformer Division, Sharon, Pa.; **R. W. Gemmell,** manager, aircraft sales department; **William C. Miller,** manager, headquarters manufacturing staff at Pittsburgh; **Carl E. Nagel,** manager, editorial service.

—o—

Louis Zinader, recently released from the Navy, now is associated with Luria Bros. & Co. Inc., Philadelphia.

OBITUARIES...

Harry E. Fuller, 50, personnel director, Cleveland Graphite Bronze Co., Cleveland, died Feb. 24. Mr. Fuller was one of the original nine employees when the company was formed in 1919. Beginning as foreman, he advanced to general foreman, division superintendent, general superintendent and personnel director.

—o—

Leonard H. Davis, 72, consulting engineer, Union Carbide & Carbon Corp., New York, died at his home in that city Feb. 19.

—o—

Robert J. Houston, author and head of the former metal brokerage firm of D. Houston & Co., New York, died Feb. 22 at his home in East Orange, N. J.

—o—

James W. Higgins, 52, chemical engineer and electroplating specialist for Packard Motor Car Co., Detroit, where he had been employed for nearly 30 years, died in Detroit Feb. 17. He was a past president of the Detroit section, American Electroplaters Society.

—o—

Huston W. Bartholomew, 61, superintendent of the Grove City, Pa., plant, Cooper-Bessemer Corp., Mt. Vernon, O., died recently.

—o—

Clarence L. Millard, 67, vice president and director, Stapling Machines Co., Rockaway, N. J., died Feb. 22 while vacationing in Florida.

—o—

Harry W. Jones, 61, chief of motive power for the Pennsylvania Railroad, died Feb. 23 at his home in St. David's, Pa.

—o—

Donald A. Cumfer, 51, general sales manager and a member of the engineering department, Guyton & Cumfer Mfg. Co., Chicago, died recently at a hospital in Hines, Ill.

Elias L. Anderson, 76, president, Crown Iron Works Co., Minneapolis, died recently in San Diego, Calif.

—o—

J. Milton Hughes, Youngstown, assistant to the president and general director of purchases, Sharon Steel Corp., Sharon, Pa., died recently at his home.

—o—

Matthew C. Fleming, 81, for many years general counsel for the Phelps Dodge Corp., New York, died recently at his home in New York.

—o—

Ted McGahan, 58, vice president, Boyle Manufacturing Division, United States Steel Products Co., Los Angeles, died recently at his home in that city.

—o—

Arthur R. Haley, general manager, Columbia Cement Division, Pittsburgh Plate Glass Co., died Feb. 14 at his home in Zanesville, O.

Porcelain-Enameled Steel Houses To Be Higgins' Chief Postwar Project

Plans production at rate of 100 to 500 a day when material and equipment become available. Five-room structure can be completely erected within week, using Thermo-Namel prefabricated units erected on site and filled with patented concrete material

DALLAS, TEX.

ANDREW J. HIGGINS JR., New Orleans builder of the war-famed Higgins boats who closed down his extensive industries last fall when AFL workers struck his plants, is going to make porcelain-enameled steel houses that cost as low as $3000. He announced this in Dallas while addressing the Dallas Salesmanship Club. But he made it clear that this new product of his research division is not to be a prefabricated house but a prefabricated unit for construction of buildings that are assembled on site. He plans to go into production at the rate of 100 to 500 houses a day as materials and equipment are available, at his New Orleans plant.

Mr. Higgins declared this to be his chief postwar project, though he will continue building boats. He offers the production of these practically all-metal houses as his solution for the housing problem, declaring that a 5-room house can be erected completely within a week with labor not to exceed eight men. He proposes establishment of subsidiary or branch plants located regionally over the country under a franchise arrangement.

Arrives Ready for Assembly

The material, trade marked Thermo-Namel, will arrive at the building site in already finished form, ready for assembly and erection, Mr. Higgins explains. It may be erected on standard foundations of any type. After the structure is erected of the Thermo-Namel units, including windows, doors, partitions, walls, rooms, closets, walk-in ice boxes, ceiling, and roof, then the entire unit is poured or filled with a patented material by Higgins known as Thermo-Con.

Thermo-Con is made from ordinary Portland cement. The ordinary cement by the Higgins process is expanded to the end that it produces high thermal qualities and great strength, and when the structure is finally poured with this material, it is said to become monolithic, giving the building high strength in resistance to hurricanes, high winds, earthquake and fire. Not only is it termite and vermin-proof but heat and cold are excluded to a high degree, Mr. Higgins claims.

The only lumber employed is in the forms for concrete foundations, where that type of foundation is desired. The floor structure may be of linoleum, hardwood or Thermo-Namel flooring for certain portions of the building such as bathroom, laundry, garage and porch floors. Steps, stairways, balustrades, plumbing fixtures may all be built of this material at a cost declared to be far less than the present methods of tiling, wall enameling and their various treatments.

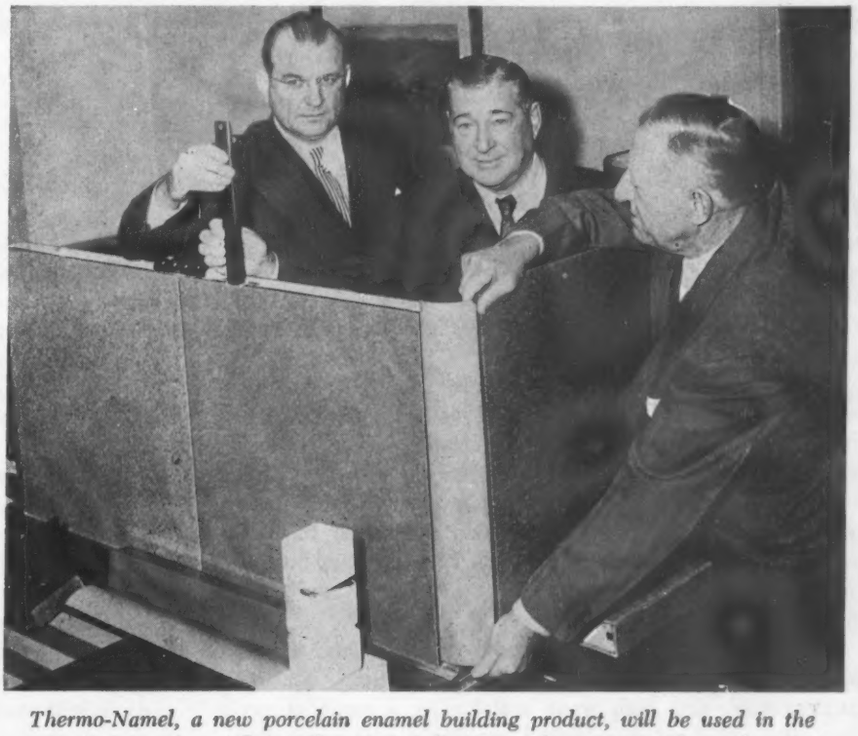
The units, parts and accessories for this type of construction will be manufactured in the Higgins plant. The manufacturer says that enameling facilities throughout the nation and foreign countries are geared up to the point that it can handle the necessary enameling materials for any amount of construction that his plant and subsidiaries could produce.

For residential work the Thermo-Namel wall or partition would be 2½ inches thick. The thickness may be increased as desired, such as to meet expediency of installing 4-inch soil pipe. Electrical conduits, switch boxes and outlets are all of standard type, sealed within the walls. Approximately 80 per cent of the electrical work is installed in the factory. The same is true of plumbing.

A world-wide market is claimed for Thermo-Namel and its component units and accessories and also Thermo-Con. "There is not a spot on the globe that this material can not displace," Mr. Higgins declares. "It is adaptable for use in any type of building. The overall cost of erecting buildings with Thermo-Namel will range from 7½ per cent to 20 per cent less than any other known form of building materials, with their attendant labor."

Charges for Packing and Loading Lead Approved

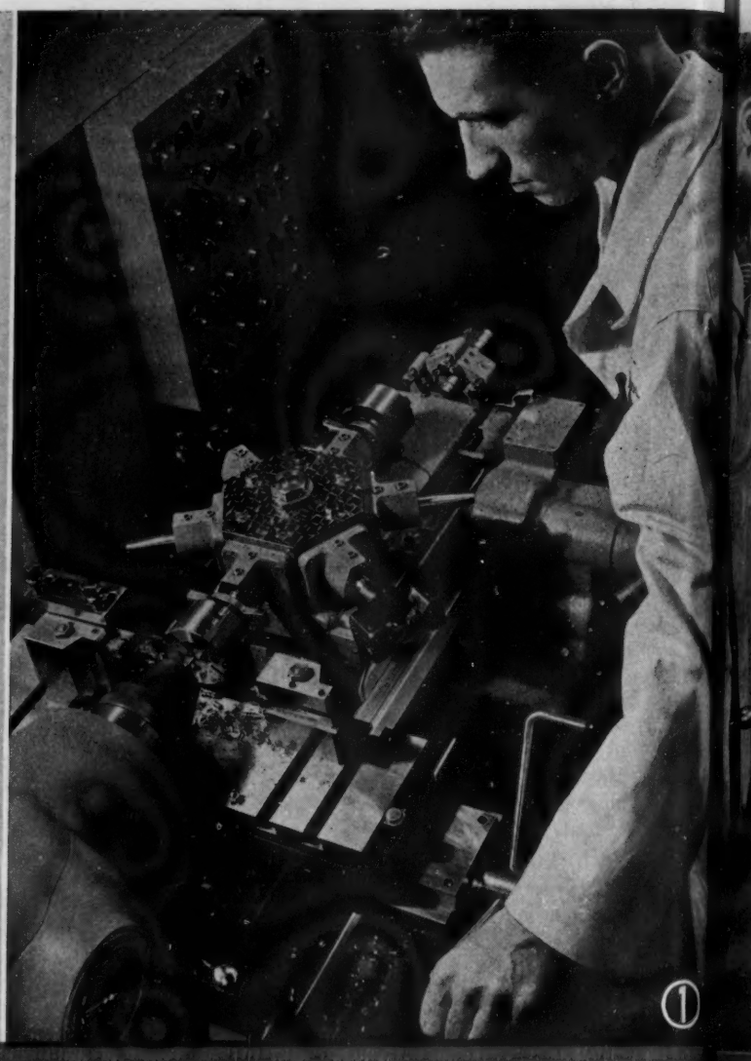
Specific charges which sellers of primary lead may make for special packing and loading have been announced by the Office of Price Administration. The additional charges are as follows: For pig lead wired or strapped, 30 cents a ton; for lead in ingots or linked ingots wired or strapped on wooden pallets, 50 cents a ton; lead in ingots or linked ingots wired or strapped on steel pallets, 70 cents a ton.



Thermo-Namel, a new porcelain enamel building product, will be used in the manufacture of prefabricated units for houses to be constructed on the site. Shown inspecting the material are, left to right: Rep. F. Herbert (Dem., La); Andrew J. Higgins Jr., New Orleans boat builder and manufacturer; Maury Digg, engineer and architect. Acme photo

Field for Lathes Broadens because Engineers Shelve Design Traditions

New line of turning machines grows out of recognition that completely revised standards of power, rigidity, speeds and feeds are demanded by carbide tooling; that tight limits on dimensions and surface quality are here to stay; that electrification involves much more than motors and push buttons; and that routine repetitive operations must be transferred to mechanisms



By GUY HUBBARD
Machine Tool Editor, STEEL

TOGETHER with a number of other technical editors, I have just been back to school. I have been through an intensive, two-day refresher course in design, construction and application to tool room and production lathes. This schooling took place at Monarch Machine Tool Co., Sidney, O., where for 37 years people have concentrated their efforts on lathe development.

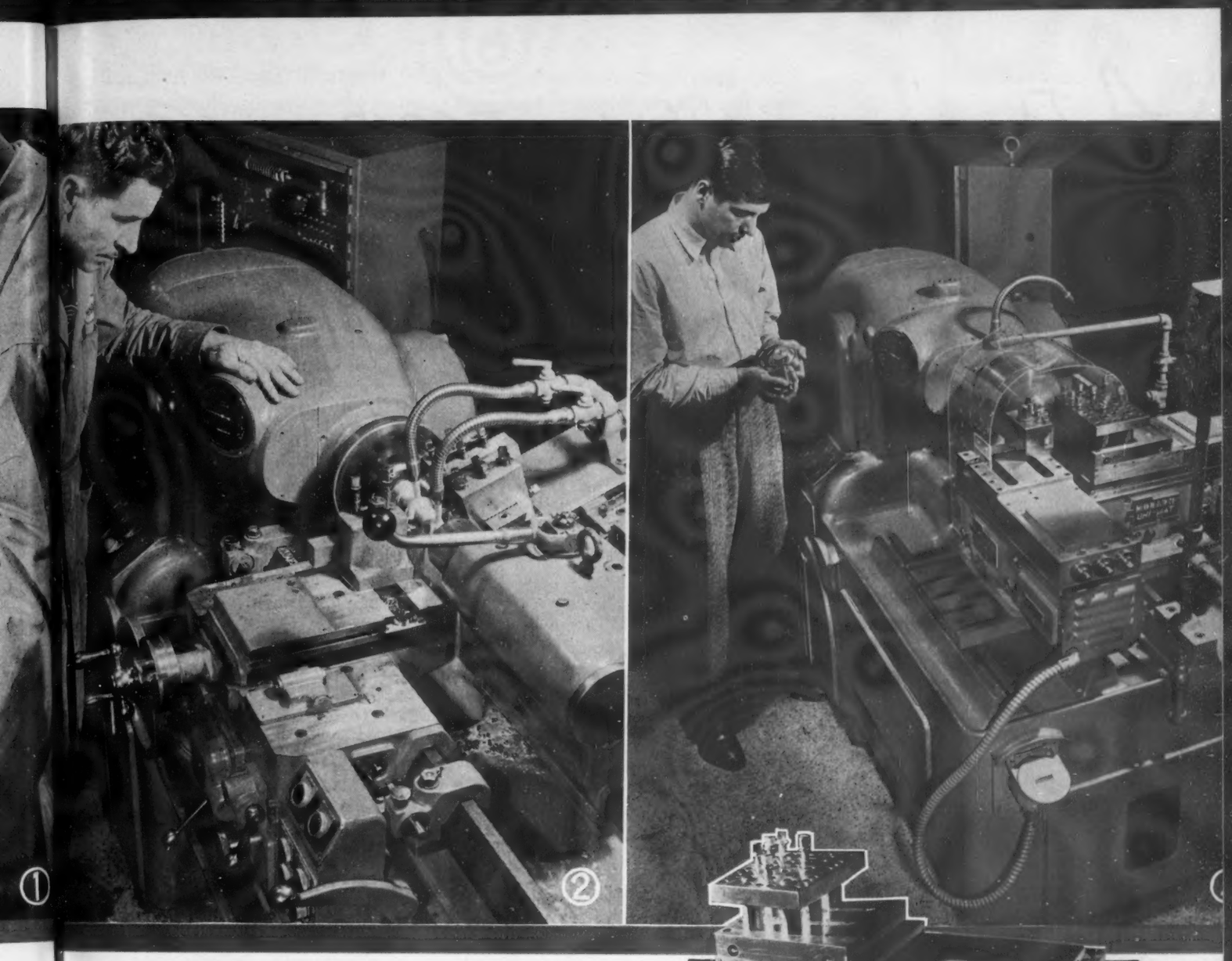
As one who began work as a lathe hand in the tool room of a machine tool plant, and has stuck close to the machine tool business throughout the intervening 30 years, I thought that I was right up-to-date on metal turning practice. By the time I had completed my recent post-graduate course at Sidney, however, I realized that no amount of familiarity with prewar lathes and with prewar metal turning practice is now any great asset to tool engineers and production men today.

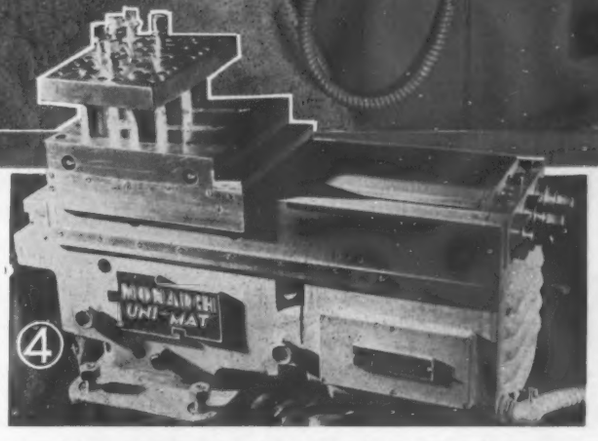
We are in a new era of cemented carbides, microscopic limits on fit and finish, instrumentation, electronic control, automaticity, and high wage scales. As a result of my two crowded days at Sidney, I am firmly convinced that prewar model lathes (and as far as design is concerned that includes practically all standard lathes built during the war) are going to be "out of the running" in the production race, just as soon as the pace is set by entries of postwar vintage such as the machine tools illustrated in this article.

I believe that the most effective way to drive home the truth of the statements just made, will be to discuss briefly some of the features of design and operation of the new metal turning machines with which we became intimately acquainted during our refresher course under the tutelage of Wendel Whipp, Stanley Brandenburg, Kermit Kuck, and their many capable associates.

Typical of these specialized turning machines is the Speed-Matic manufacturing lathe shown in action in Fig. 1. Designed to handle lots ranging from 25 to 500 pieces —especially those made from bar stock up to ⅞-in. in diameter—this six position turret machine gives preselected spindle speeds ranging from 50 to 5000 rpm. The turret has power feeds ranging from 0.005 to 0.016-in. per revolution. Stock feeding is done by air as the collet is opened and closed manually. The cross slide of this machine runs on ball bearings and is operated manually, but returns to central position through spring action.

As is indicated by the panel behind this machine, it is highly electrified. This involves a Reliance 3 hp variable speed main drive, complete with motor-generator set which converts alternating into direct current. The panel just mentioned covers potentiometers and various other elec-





trical devices involved in automatic changing of spindle speed to suit each operation.

Speeds suitable for each turret tool and for cross slide tools are preselected by means of the potentiometers. As the turret indexes, it comes back against a small finger which controls the circuit through the potentiometers. On the 10-station panel, six are for turret operations, two are for front and rear cross slide operations, and two are for other phases such as forward or reverse speeds for tap and die operations. By means of a manually operated reset button, the entire panel can be restored to original starting condition—this remaining until the turret is indexed for the initial operation on the work.

Such a machine as this has far outgrown the old term "hand screw machine." Screws are only the simplest of the wide variety of parts which it will produce with snap and precision. To no small degree the machine "thinks" as well as "acts" for itself. Such transfers of routine thinking and acting from man to mechanism are characteristic of the latest machine tools, particularly where mental and physical processes involve repetitive operations.

Having brought up this subject of built-in thinking and acting, it now is logical to turn to another and even more highly specialized new turning machine called the Mona-Matic. This is shown in Fig. 2, operating on just such a

(*Please turn to Page* 142)

Fig. 1—This high speed manufacturing lathe makes use of potentiometer system actuated through back stroke of turret to preselect spindle speed for each succeeding operation

Fig. 2—Semiautomatic lathe for production machining of gear blanks, bushings, stepped shafts, etc., has rear carriage with independent motor, mist-lubricated headstock with spindle speed up to 3000 rpm and cycle control including timed dwell of front and rear tools

Fig. 3—From one to three independently motor driven, electrically controlled tool slide units can be mountea on this machine to suit the work at hand. Connected to the basic machine only through electrical cables, these units are timed so that they run through their cycles efficiently and without interference

Fig. 4—Tool holding and feeding unit of tool relief type prior to mounting on the lathe base as in Fig. 3. These units also lend themselves to use on special machines, including those of multiple head variety

A Discussion of the two E6013 WELDING ELECTRODE

THERE are two distinct conceptions of the E6013 electrode, each of which offers some very interesting welding characteristics. Nor is the evolution of the two different types merely designed to add further confusion to what some people consider an already complicated situation, the selection of the proper electrode for a specific welding job. As is true of every other advance in our complicated technical civilization the two E6013 electrodes were fathered by necessity. Furthermore the rapid growth of the younger of the two attests an expanding utility that threatens encroachment upon fields heretofore considered restricted to the E6010 classification.

To simplify this discussion of the important properties of these electrodes a suffix will be applied to each. Thus E6013A will be the generally accepted type with the "A" symbolizing *accepted*. Similarly the newer electrode, at least as far as the number of different manufacturers producing such a type, will bear the suffix "U" for *unusual*, i. e., E6013U. E6013A was first made for alternating current use where low open circuit transformers were used for a wide variety of repair and maintenance welding. Extremely good arc stability with easy striking was the primary requirement. Later on the excellent arc stability led to a widespread adoption of the E6013A electrode for sheet metal fabrication. Here the E6013A type proved to be without a peer.

For a long while welding engineers have been somewhat less than satisfied with E6010 electrodes and this dissatisfaction was aggravated during the war when large numbers of welders with skill limited by the very short time available for training were pressed into service. A marked increase in the consumption of E6013U electrodes was a natural aftermath when the greater arc stability of the newer electrode was taken into account.

Some controversy raged over the proper AWS classification for the E6013U electrodes. Whether this group was really E6010, E6011 or E6013 was a moot question that may not be properly resolved even at this late date. However most producers have decided upon an E6013 classification although physical property results to be discussed later will disclose the reason for the doubt.

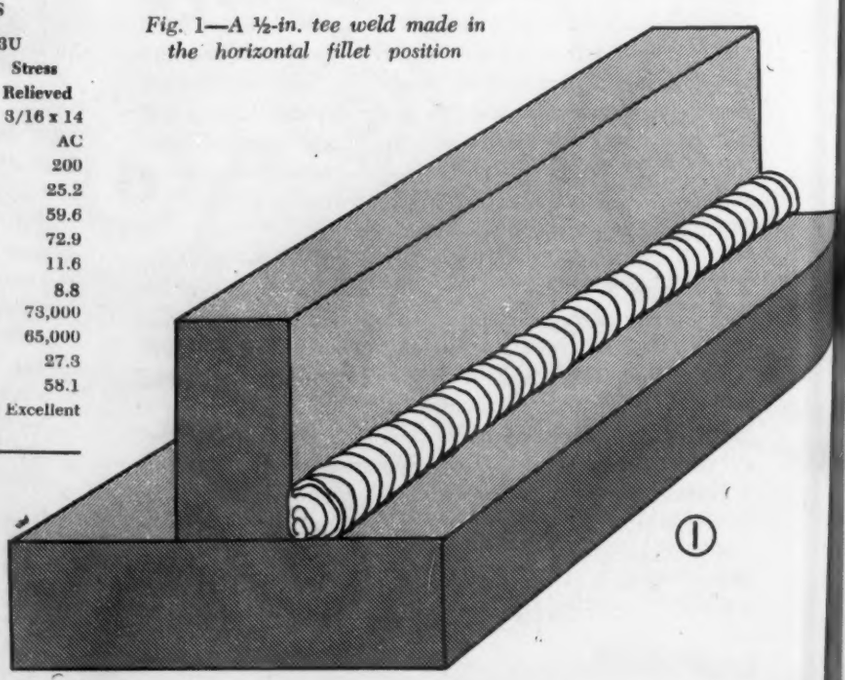
For the moment, then, E6013U electrodes will be considered in the E6013 division for the following explanations: First, E6013U electrodes can be applied with alternating current, a condition not proper for E6010 electrodes in the classic design; and, second, E6013U electrodes have a soft arc with limited penetration as opposed to the harsh, digging arc of the E6011 group. Besides some sizes, under specific conditions of use, will not meet the physical requirements of the E6010 and E6011 electrodes particularly with reference to ductility.

E6013A electrodes are primarily intended for thin sec-

PROPERTIES OF TWO E6013 ELECTRODE TYPES

	E6013A		E6013U	
Property	As Welded	Stress Relieved	As Welded	Stress Relieved
Size	3/16 x 14	3/16 x 14	3/16 x 14	3/16 x 14
Current	AC	AC	AC	AC
Amperes	200	200	200	200
Volts	23.8	24.0	25.6	25.2
Dep. Rate, oz/hr	63.0	63.1	59.2	59.6
Efficiency, %	78.5	79.1	72.5	72.9
Spatter Loss, % core	9.4	8.7	12.1	11.6
Burn-off, in./min	9.2	9.2	8.8	8.8
Ultimate Strength, psi	73,500	66,000	76,000	73,000
Yield Strength, psi	59,000	50,500	66,250	65,000
Elongation, % 2 in.	18.0	30.1	22.2	27.3
Reduction in Area, %	33.8	60.6	45.9	58.1
X-ray	Fair	Fair	Excellent	Excellent

Fig. 1—A ½-in. tee weld made in the horizontal fillet position



Both "A" and "U" types have advantages, says the author, but, generally speaking, the former seems best suited for sheet metal and the latter for heavier work

TYPES

By ORVILLE T. BARNETT
Production Engineer
Welding Division, Metal & Thermit Corp.
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tions and sheet metal welding running to a maximum base metal thickness of about ¼-in. E6013U electrodes have found a greater popularity for the welding of heavier sections from ¼-in. up. Some users have found a place for E6013U electrodes in sheet metal fabrication but the number of such uses is small compared with the E6013A group.

Both electrodes are adapted to all position welding. E6013A electrodes are colder than E6013U electrodes. Sheet metal techniques encountered with the former will be described first.

Experienced sheet metal welders soon learn to select high currents and fast rates of travel for the best results. Fit-up must be of the highest possible quality and work is held in alignment either through jigging or by the tying action of many, closely spaced tack welds. Where many similar welds are to be made, sturdy jigs equipped with copper strips or blocks to absorb heat permit fast, uniform welding. In the flat position a short arc tends to give the best results. Poor fit-up, especially if any appreciable gap exists, will place the welder in jeopardy of burning through. Even at best a lower current and slower travel speed will be necessary, increasing the cost of the welding in addition to depositing a bead of larger size than the job requires. The neatest sheet metal welding shows a small, uniform bead in keeping with the thinness

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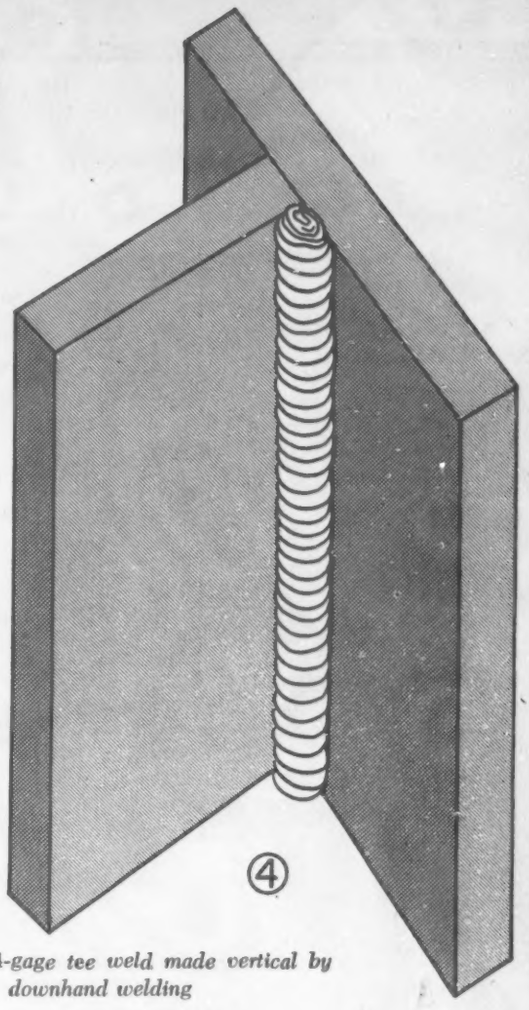


Fig. 4—A 14-gage tee weld made vertical by downhand welding

Fig. 3 — A ¼-in. tee weld made vertical up

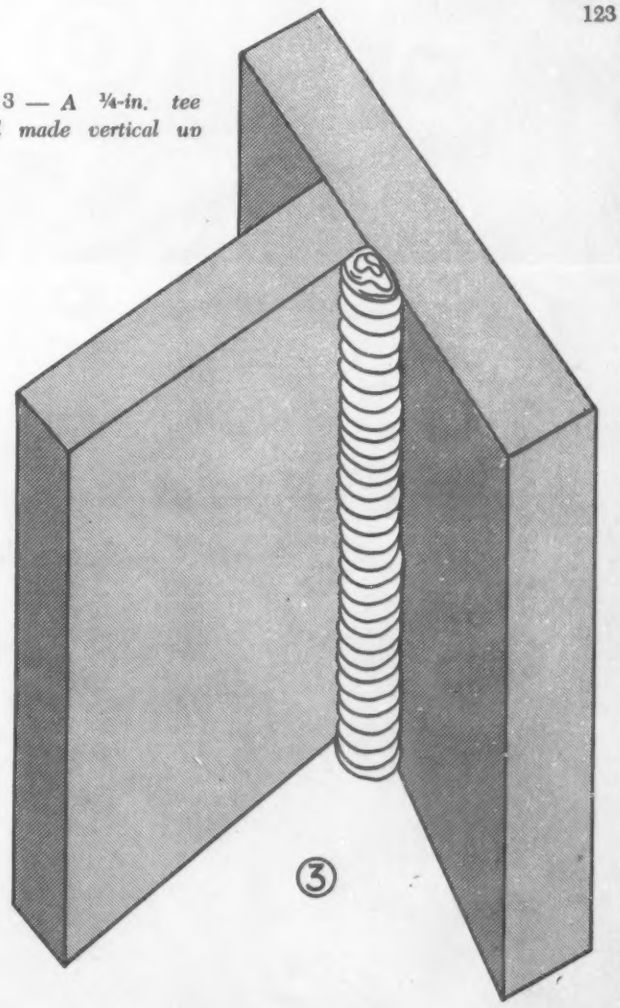
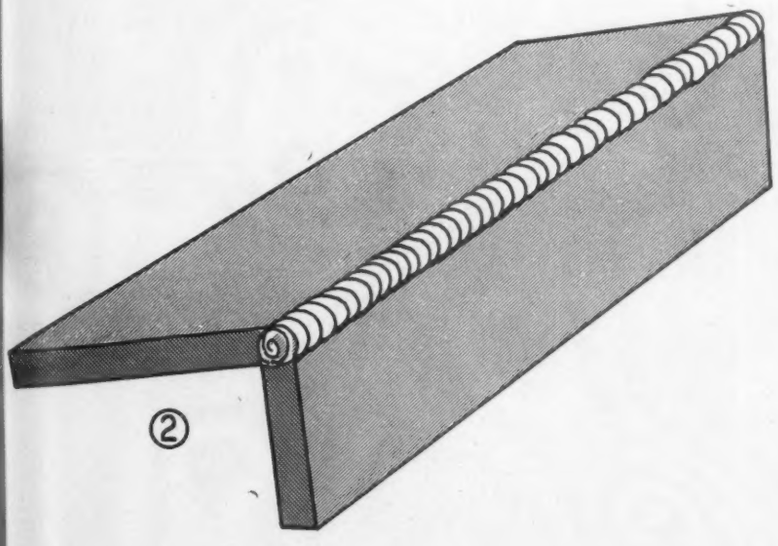


Fig. 2—An 18-gage horizontal corner weld

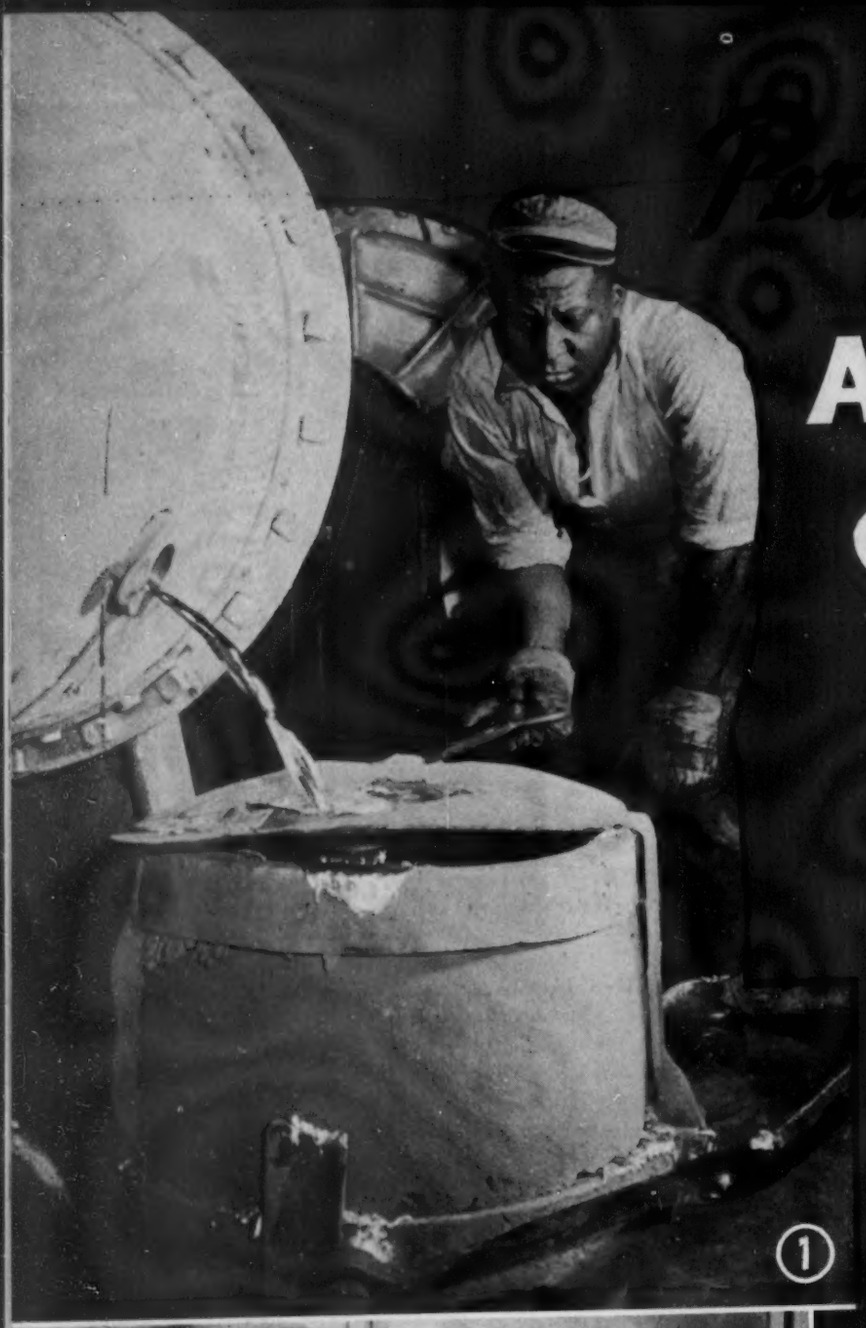


Permanent Mold

ALUMINUM CASTINGS

... are made by highly perfected technique

By HIRAM BROWN
Assistant Works Manager
Work Road Aluminum Foundry
Aluminum Industries Inc.
Cincinnati



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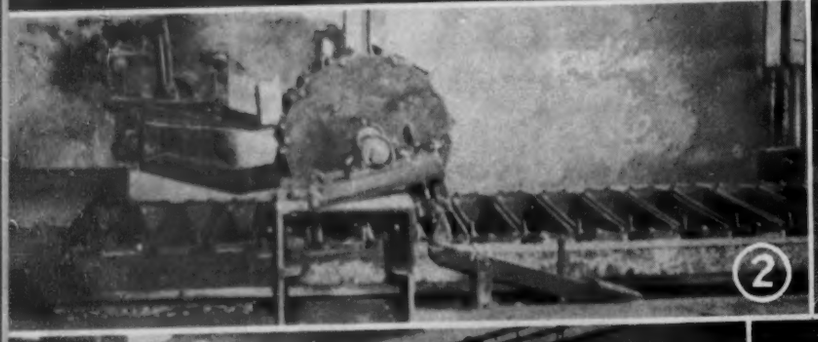

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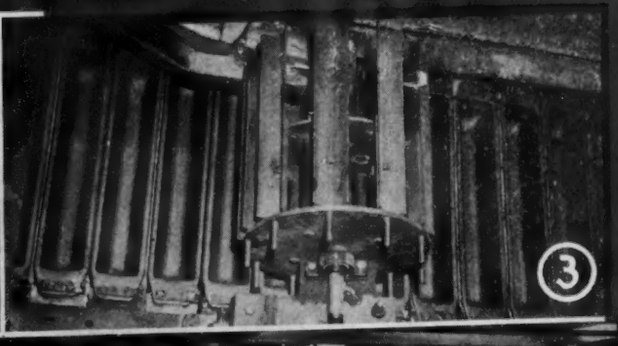

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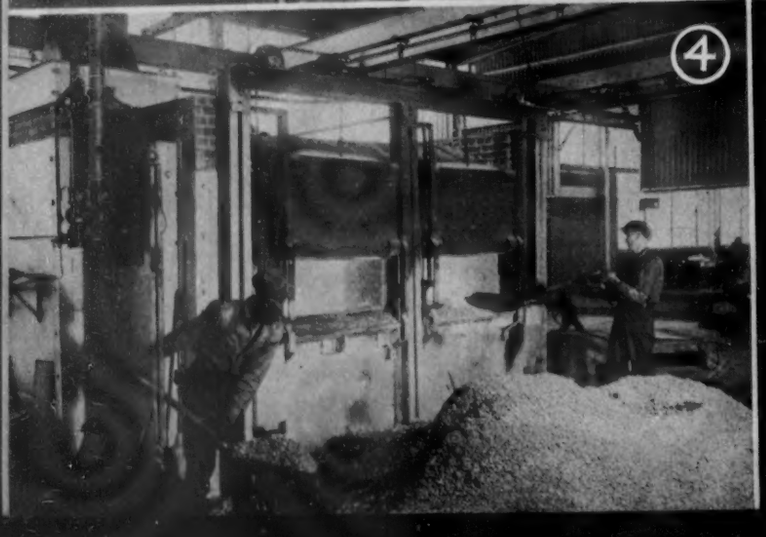

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CHARACTERISTICS of permanent mold aluminum castings make them particularly suitable for many parts where quantities involved are sufficient to warrant tooling up for this method of production. A typical example is an end bracket for an electric motor. Weighing 4 lb, 6 oz as a sand casting, the same part weighs only 3 lb, 10 oz when made in a permanent mold. In addition, the closer dimensional tolerances obtained mean less metal to be cut away in machining, and the uniformly accurate dimensions allow faster metal removal.

In the permanent metal mold process, castings are precision made to tolerances as close as plus or minus 0.010-in. This compares with the standard of plus or minus 0.030-in. for sand castings. Smooth surfaces and fine grain structures are added advantages.

Output from machining lines is high because of the uniform dimensions of the permanent mold castings. For example, master brake pistons are easily machined at rate of 1000 per hour on a standard 6-spindle Acme Gridley automatic.

Just as the name implies, permanent mold casting has the aluminum solidify inside the metal walls of a permanent mold, the metal wall surfaces hastening the cooling process and thereby producing a finer grained casting with greater tensile strength. In many cases, this added strength makes it possible to safely reduce the thickness of sections with a saving in metal, weight and money.

Built in 1941 just before the war, Aluminum Industries' Werk Road aluminum foundry is one of the finest and best equipped in the country. Output is tremendous, both in total volume and in variety of parts handled. Some 26 different aluminum alloys are cast. More than 600 molds in all sizes are found. Aluminum pistons are one of largest production items, some 25 different types often being in production at one time. Aluminum connecting rods are another large item, as are injector type carburetor bodies.

Normal capacity is around 2 million pounds of aluminum castings per month. Permanent mold castings constitute three-fourths of this total, the remainder being sand mold castings.

Melting facilities are headed up by a battery of reverberatory furnaces each melting 20,000 lb at a time. Use of Zirconite bottoms on these furnaces by extending life of bottoms from about 3 months to a year, has enabled the plant to save an estimated $10,000 yearly, because the Zirconite bottoms can be run for a year or more without changing, while melting 10 million pounds or more of metal. The furnaces have automatic temperature control.

These are supplemented by a battery of 10 2000-lb rotary melting furnaces and some 1000-lb and 350-lb tilting furnace units. The trend is toward increased use of these tilting furnaces with complete automatic control, gas or oil fired.

Metal to be cast starts from aluminum ingot or scrap, melted in a reverberatory furnace, Fig. 4. Alloying elements are added to get the analysis desired. Using a continuous mold conveyor with automatic cooling and discharge, 20,000 lb of metal is cast into ingots in 2½ hr.

Figs. 2 and 3 show a special pouring device that has made it possible to cut dross loss by 80 per cent, obtain 350 lb more good metal from each heat, cut maintenance

Fig. 1—Pouring molten aluminum alloy from tilting type remelting furnace into holding pot that serves casting stations

Fig. 2—Front view of "barrel" with rolled steel angle sections that automatically cover space between adjacent molds as molds pass under pouring spout, thus assuring metal does not fall between molds

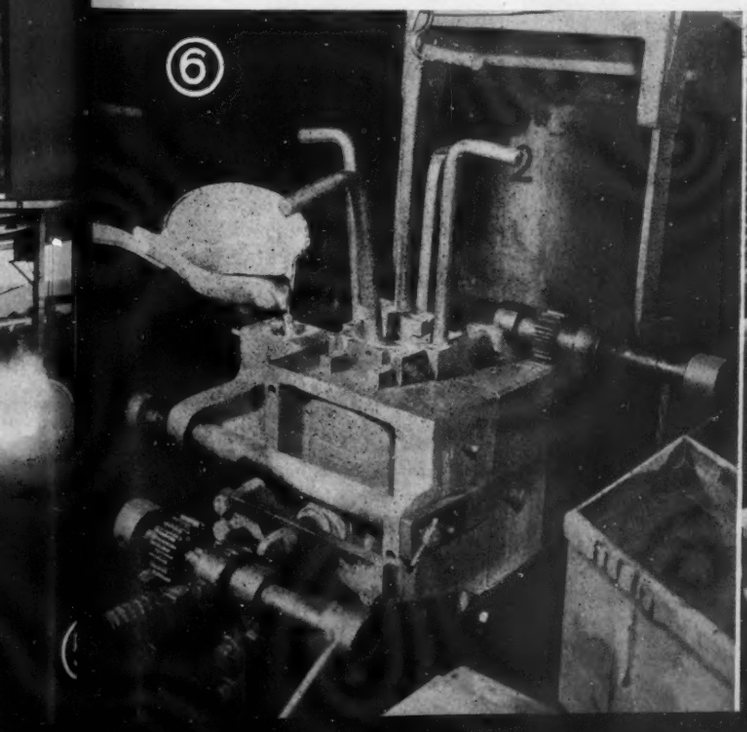
Fig. 3—Top view of device for guiding molten stream in continuous pig casting

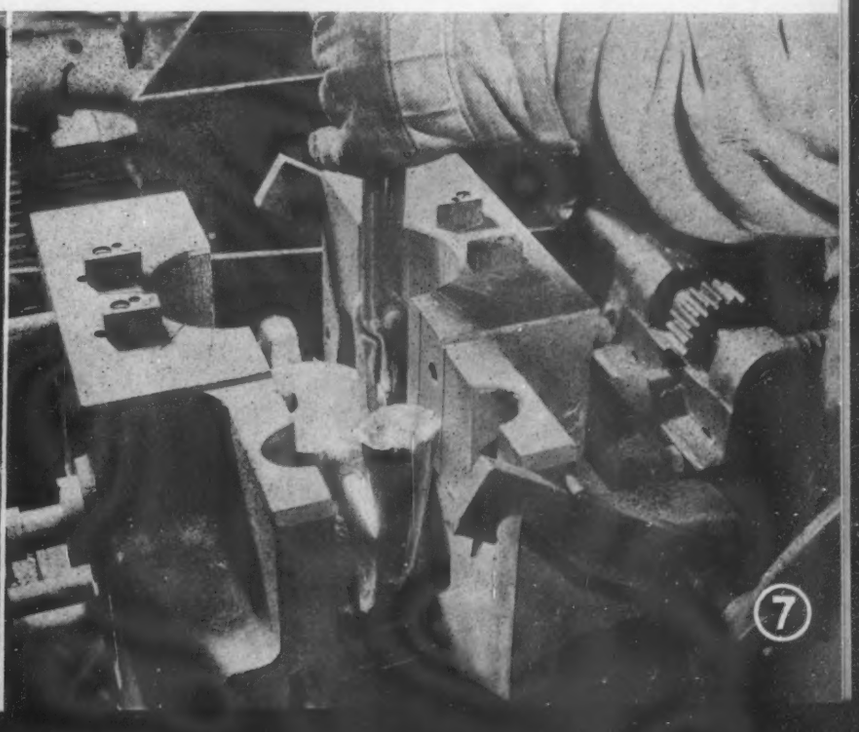
Fig. 4—Charging a 15,000-lb capacity oil-fired reverberatory melting furnace with turnings and borings. Alloy ingots will be added to produce composition required

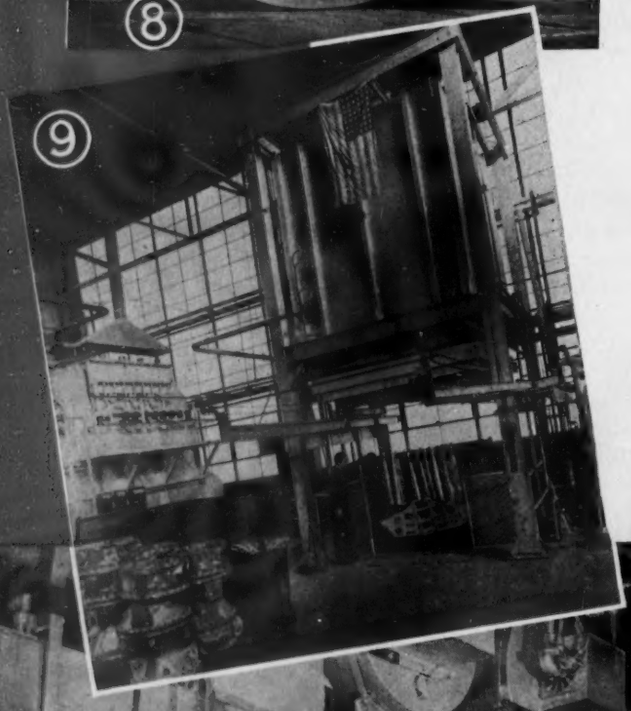
Fig. 5—Battery of ten 2000-lb capacity oil-fired rotary aluminum melting furnaces. Units are tilted to discharge molten metal as in Fig. 1

Fig. 6—Molten metal is ladled from holding pot into permanent molds as shown here

Fig. 7—Mold here has been opened for removal of the casting after metal solidifies







cost on the mold conveyor and molds by 90 per cent and save about 50 ingot molds per month.

These important savings are obtained by directing the continuous stream of molten metal so that it is shifted quickly from one mold to the next as they pass continuously under the pouring spout. Formerly, considerable metal was lost in the space between molds, although they were located as closely together as practicable on the conveyor, and when the metal cooled it was pinched between molds thus resulting in many cracked molds.

Now however, a barrel type device is arranged directly over the conveyor at the pouring station as shown in Figs. 2 and 3. This carries a series of longitudinal bars made from rolled steel angle sections. The entire device revolves in synchronism with movement of the conveyor in such a manner as to cover the space between molds by an inverted rolled steel angle.

Thus as the molds move along under the pouring spout, the stream of molten metal runs in one mold till the angle moves under the spout. Then instead of running into the space between molds, the angle continues to direct the molten metal into the first mold until the apex or peak of the angle passes under the spout. Then it shifts the stream of molten metal into the next mold—no metal is wasted by running into the space between molds.

Note in Fig. 2 that provision is made to disengage the device when desired by lifting it off of the molds through a lever and foot-operated pedal.

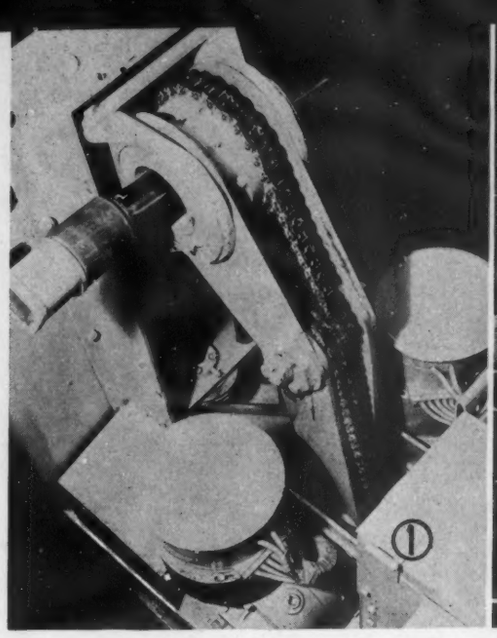
After alloying to proper analysis, ingots are remelted in the rotary or tilting type furnaces and poured from there into pots of 600 lb capacity (see Fig. 1) where metal is held until ladled into a permanent mold. Each holding pot serves two permanent molding stations like that shown in Fig. 6 where metal is being ladled into the mold.

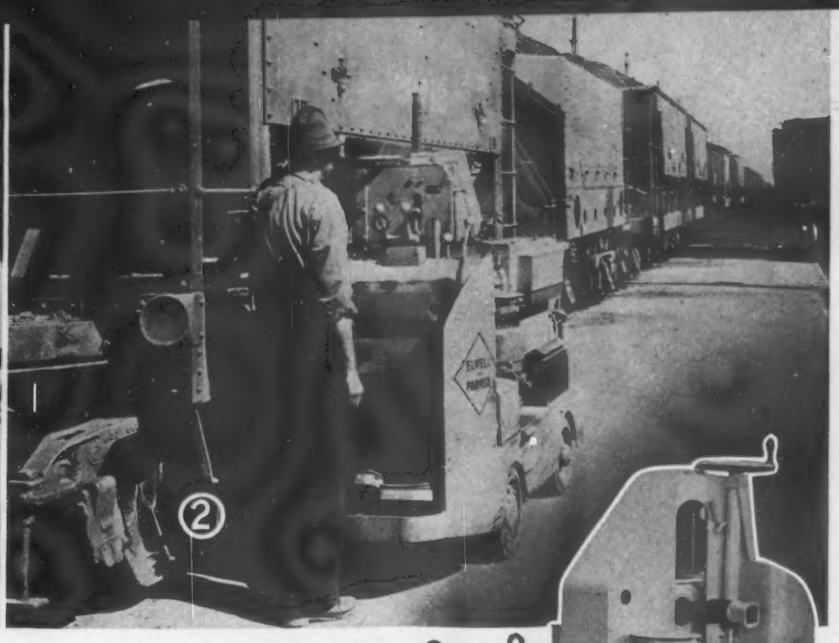
Fig. 7 shows the solidified metal being removed from the permanent mold, while Fig. 8 reveals the piston that has just been cast. Gates and risers subsequently are cut off and casting is heat treated as in Figs. 9 and 10.

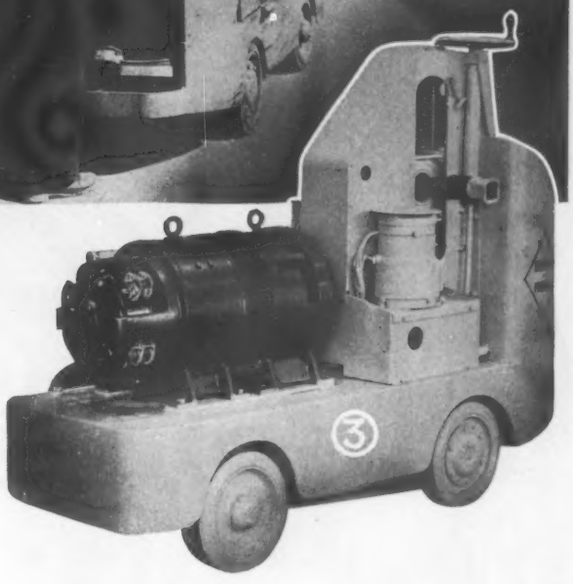
Fig. 8 — Inspector checks casting from permanent mold in Figs. 6 and 7. Gate and risers will now be cut away

Fig. 9 — Elevator or "drop" type heat treating furnace has quench tank located directly below for rapidly quenching the work from high temperature

Fig. 10 — Cast aluminum pistons loaded on racks being run into the heat treating oven for a low temperature precipitation treatment







"PLUG-IN" Power Truck

. . . is provided with a wrench to open and close iron ore hopper-car gates; obtains electricity through cables

FLOW of iron ore into lake vessels which carry it to steel plants has been speeded by a power industrial truck which, instead of generating its own power, obtains electricity from a supply line through a 100 ft long flexible cable plugged into sockets spaced at regular intervals along vessel-loading docks.

Motors on the truck provide power for maneuvering and for rotating an adjustable wrench which serves as a key to open and close bottom gates on iron ore hopper cars. Heretofore it was necessary for two men using a 4-ft long wrench weighing 55 lb to operate the ratchet device controlling the gates in the bottom of the hopper cars. Even in mild weather, this is a laborious task.

In place of a storage battery, there is a 3-phase, 220-v ac motor connected with a generator supplying current at 32 v. This motor-generator set is shown in the exposed portion of the truck in Fig. 3. Generator's output is the same as that derived from storage batteries used in standard-type power trucks. The output operates a motor rated at 2-hp for driving the truck's wheels and two auxiliary motors each rated at ¾-hp for adjusting and turning the wrench.

One auxiliary motor (lower center in Fig. 1) operates the shaft which terminates in a sprocket and drives chains which turn the wrench. The other auxiliary motor is used to raise or lower the wrench in its guideway. Power for this motor is transmitted by means of a V-belt pulley and screw, as shown in Fig. 1.

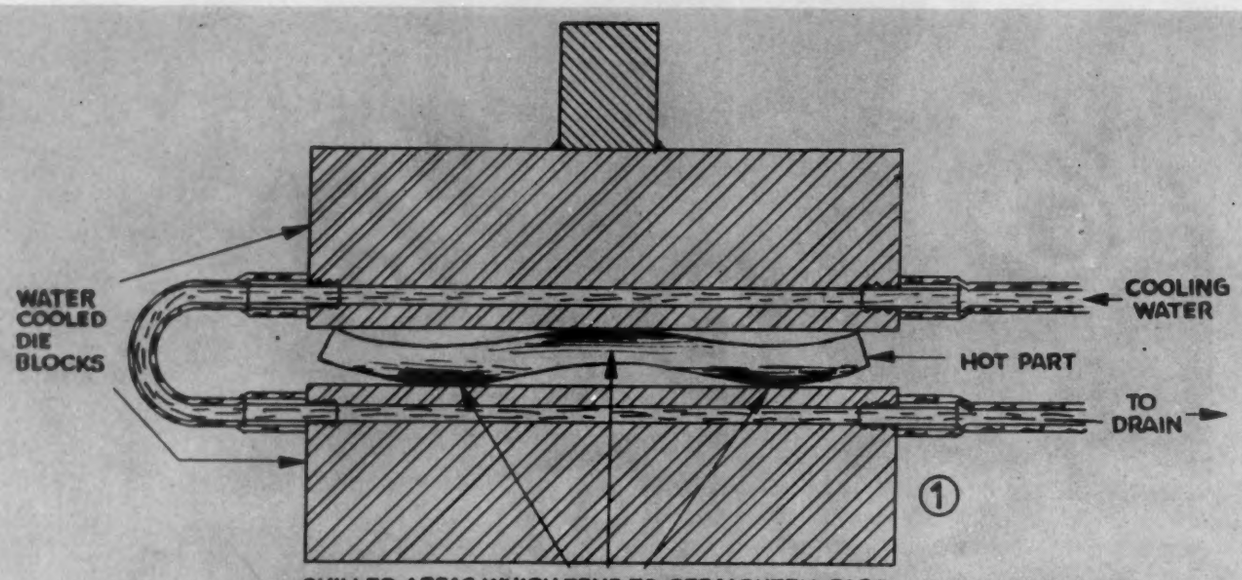
Height of wrench may be adjusted within a range of 30 in.; adjustment depends on size of the car. Operation at any height always is positive due to pivoted, pantographic-type arm. The square steel bar terminating in a socket is 3-ft long, and is movable horizontally.

Operator lines up truck with the squared end of shaft on the ore car, adjusts wrench to shaft, turns on power and bottom gates are opened, thus freeing the ore which drops into the dock's "pockets." Gates are closed by reversing movement of the wrench. The unit was developed by Elwell-Parker Electric Co., Cleveland.

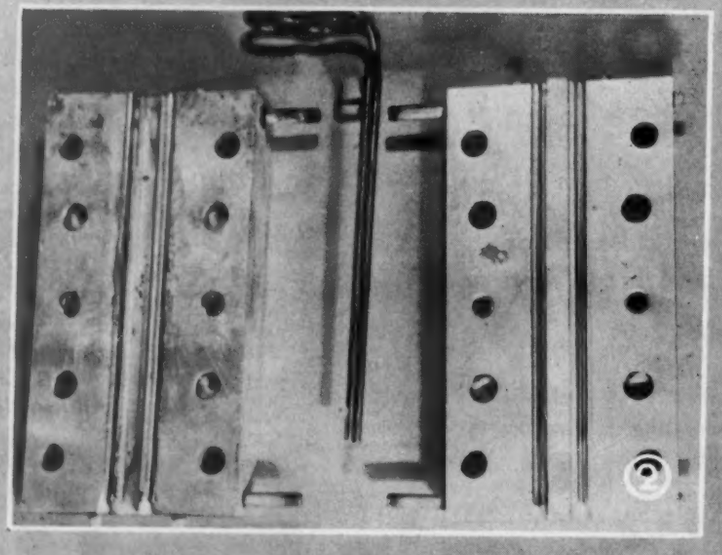
Fig. 1 — Auxiliary motors drive and adjust wrench (cover removed) which opens and closes gates. Note dual sprockets, weight of chain, and sturdy construction of unit

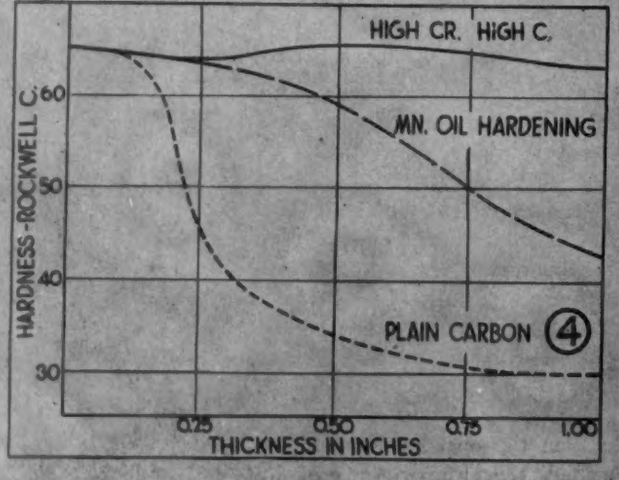
Fig. 2—A line of hopper cars on an iron ore loading dock in the Lake Superior district ready for gas-electric industrial truck shown to open and close bottom gates

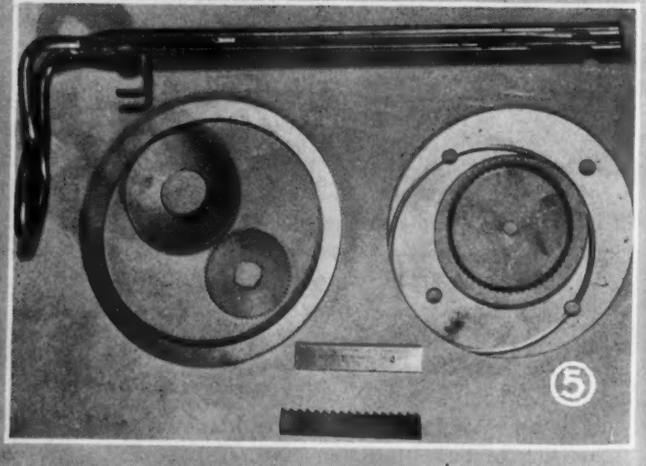
Fig. 3 — Overall view of truck with covers removed



CHILLED AREAS WHICH TEND TO STRAIGHTEN PART BY THEIR NATURAL CONTRACTION.







COLD-DIE Quenching

By A. F. GALLISTEL
Assistant Plant Manager
Thomas & Skinner Steel Products Co.
Indianapolis

Indianapolis company hardens small parts without distortion by quenching in water-cooled steel dies after heating

HEAT TREATERS who have tried to avoid stresses due to non-uniform quenching, because these stresses warped the work, will naturally view very skeptically any suggestion that these stresses may be employed to straighten parts in heat treatment. However, this is what happens when "cold die" quenching is used to harden steel parts. Use of the dies for quenching was originally developed for one particular job in which blades of a very unusual steel with practically "air hardening" properties were quenched for flattening between cold steel blocks. It was learned that "cold dies" which eliminate contact of liquid quench with the part, gave excellent results on flattening and hardening.

Fig. 1 Diagrammatic sketch illustrating straightening due to non-uniform cooling

Results were so satisfactory that immediate efforts were made to apply the process to many other jobs and it has since developed into an extremely useful and quite widely applicable tool for our heat treaters. A hardening operation on a thin washer or disk, or on a long slender rod has always been looked upon as the chief source of distortion, therefore costly hand straightening and high scrap losses have always been the accepted rule on this class of material. Over the past year or two however, it has been possible to alter this situation. Hardening operations are being used to straighten such parts rather than merely maintain good shape, distortions caused in the processes which precede heat treating are being removed.

Fig. 2 Die blocks used for quenching hair-pin shaped part. Blocks are mounted so that die channels for the legs are in a vertical position thus obviating turning of parts during charging from furnace to press

For example, large thin thrust washers blanked out of cold rolled steel that have oil grooves machined half way through their thickness always come from the blanking and machining operations considerably out of flat. A bow of 0.050-in. is quite common and even more may be found occasionally, but the washers after hardening are held flat within 0.005-in. Like most welcome shop practices, the method used is an extremely simple one—the parts are squeezed between a pair of water-cooled die blocks which replace the conventional quench.

Fig. 3 Part to be hardened being charged into quenching die

Use of dies in such hardening machines as the familiar Gleason press is, of course, an old story. Though there has been occasional mention of using water-cooled dies on such highly specialized applications as hardening steel propeller-blades, application of these dies certainly is not nearly as common as it might be on everyday heat treating jobs. The use of a die surface for a cooling medium is obviously limited to parts of large surface and small mass. This would be a severe limitation if it were not for the fact that these are the parts which always give the worst trouble with warpage in hardening.

Fig. 4 Effect of thickness on die-quenched hardness of different tool steels

Fig. 5 Typical examples of parts hardened by cold die method

The use of solid dies in quenching may have been given too little consideration because of the assumption that the cooling of a hot piece of metal by a cold piece of metal by conduction would necessarily be a very slow process which would limit its use to steels of very high hardenability or even air hardening steels. This assumption is quite false, actually a piece of 0.030-in. thick steel will cool to a temperature below

(*Please turn to Page* 172)

Pressed Metal EXPOSITION

Display of old and new stamped and formed metal parts and products helps Toledo makers emphasize striking advances in design and engineering since the turn of the century

A RECENT exposition sponsored by the Toledo district of the Pressed Metal Institute focused attention on the strategic role of stampings in the production of strong, light, attractive and low-cost consumer and industrial products. Featuring metal stampings and products assembled almost exclusively from stampings, the exhibit was held in the Macomber Vocational High School, Toledo, O., on Feb. 20, 21 and 22. It proved the rule that there is always something new and, conversely, that a few ideas which seem new are "old stuff" to grandpa.

Contrast between old and new—afforded by a wide variety of modern equipment and interesting examples of early home appliances and equipment—was the exposition's theme. Demonstrating advances in design and manufacture were exhibits showing modern kitchen cabinets of steel, and the newest mechanical refrigerators, side by side with an old wooden ice box and a very early ice box made of stampings (Fig. 1). A modern space heater was shown alongside an early type heating stove (Fig. 3), and a modern electric range. Old and modern stamped bath tubs, vending machines, and component parts for vacuum cleaners, kerosene range burners, sewing machines, kitchen tables, typewriter tables, skooters, skates and many other items were exhibited.

Of great interest to refrigerator manufacturers was a 40-year old circular refrigerator of stamped metal parts, so made that shelves could be rotated. Round refrigerators now are being seriously considered by the industry because the design would make convenience in use a strong talking point.

The bathtub exhibit included one of the first stamped—steel porcelain-enameled tubs, made in 1907. The pressed metal tub of today weighs only one-third as much as the cast iron type. Tool and die sets for this work were developed by Toledo Tool & Machine Co., now part of E. W. Bliss Co.

Early model automobile fenders and hoods and their late model counterparts provided some interesting comparisons in methods of production as well as final appearance. French-type hood of the 1904 air-cooled Franklin, and other body parts of ancient vintage, stood out in contrast with the smooth lines of the efficient "alligator" hoods of today's cars. Among up-to-date parts shown were

Fig. 1—(Above) — Assembled from stampings, this 40-yr old progenitor of circular refrigerators now under test also had rotating shelves

Fig. 2—(Below)—Oliver tractor frame and instrument panel of pressed metal parts

Fig. 3 — (Below, right) — Early heating stove and modern heater

Announcing

A NEW AND DIFFERENT AIR-HARDENING TOOL STEEL

Carpenter VEGA

U. S. Pat. 2,355,224

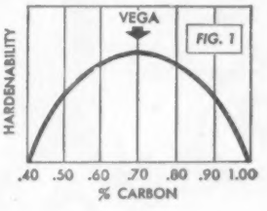
Tool makers have long expressed the desire for a *tried and proved* non-deforming die steel that would combine the deep-hardening characteristics of air-hardening steels with the simplicity of low temperature heat treatment possible with many oil-hardening steels. VEGA is a new type of air-hardening steel developed in the Carpenter laboratories to meet this need.

HARDENS IN VERY HEAVY SECTIONS

VEGA will harden to Rockwell C-60 from surface to center in sections as large as 8" diameter by cooling from 1550° F in a free circulation of air. In smaller diameters, hardness values will be slightly higher.

Carpenter's metallurgists discovered that the hardenability of this type of steel is influenced in an unusual way by Carbon content. As shown in Fig. 1, maximum hardenability is obtained at a Carbon content of about .70%. This is particularly noticeable in heavy sections. Further, percentages of other alloys were proportioned to afford the best combination for maximum hardenability and toughness.

VEGA combines, for the first time, the deep-hardening characteristics of air-hardening steels with the simplified, low temperature heat treatment of many oil-hardening types.



LOW HARDENING TEMPERATURE
Pack Hardening Not Required

VEGA can be heat treated from a temperature 200° F lower than the 5% Chrome air-hardening steels. Therefore, pack hardening and special high temperature furnaces are not required.

MINIMUM DISTORTION and SIZE CHANGE

When dimensional changes in heat treatment must be held to an absolute minimum, VEGA should be considered for the job. Properly hardened, VEGA will expand about .0005" per inch of length when air cooled at room temperature. Drawing at 400° F returns it to within .00025" of its original size.

Carpenter
AIR-HARDENING
TOOL STEELS
100% ACID-DISC INSPECTED

VEGA ALSO GIVES YOU THESE EXCLUSIVE ADVANTAGES

GOOD MACHINABILITY • FREEDOM from EXCESSIVE SCALING
RESISTANCE to DECARB • EXCELLENT TOUGHNESS

ASK FOR THIS NEW FOLDER It contains more information about VEGA, and the jobs it can do for you. Just drop us a line and your VEGA folder will be on its way to you.

THE CARPENTER STEEL COMPANY • 139 W. BERN STREET • READING, PENNSYLVANIA

BRANCHES AT: Buffalo, Chicago, Cincinnati, Cleveland, Detroit, Hartford, Indianapolis, New York, Philadelphia, Providence, St. Louis

the White 1-piece cab roof and front cowling, while the highlight of this exhibit from an engineering standpoint was the technique that led to production of both front fenders in a single piece, subsequently split apart. Both tooling and production are credited to Toledo firms.

Fasteners exhibited by a large producer included many ingenious devices that aid in assembly of automotive, aircraft and various sheet metal components. Stampings used in war materiel showed the part taken by the stamping industry to make possible mass production of military equipment and ammunition.

Fig. 2 was exhibited to demonstrate effective redesign of tractor frame and instrument panel. This item previously had been produced as a casting for the Oliver tractor. Saving in weight and material cost is apparent. Performance of such redesigned parts, once assembled in the finished product, is improved because of the ease of strengthening critical sections without adding materially to weight.

Cooling assembly for the refrigeration industry, illustrated by Fig. 4, was made

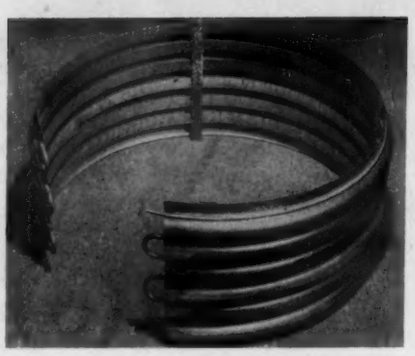


Fig. 4—Cooling assembly showing forming done after brazing

up of six louvers preformed in a straight piece. Assemblies of this kind are good examples of modern press-work. In production, Bundy tubing is welded in position on the piece, copper is applied, and the whole joined by hydrogen electric brazing. Forming into the hoop shape follows, with spot welding of spacer bars completing the job. Ability of the brazed joint to stand working indicates extension of assembly principles to many items that still have operations to be performed on them.

Thirty-five years elapsed between the introduction by E. W. Bliss Co., Toledo, of its 1911 model toggle press (Fig. 5), and the current model 2ET-650-108, shown in Fig. 6. Equipment was pictorialized to show advancement in design over that period. Although the Toledo Machine & Tool Division of the Bliss company has been making presses since 1887, it was not until 1941 that the first toggle presses were produced. Early model has capacity of 400 tons on the plunger and 200 tons on the blank holder, whereas the model in Fig. 6, a double-action toggle press, has capacity of 650 tons on the plunger and 325 tons on the blank holder.

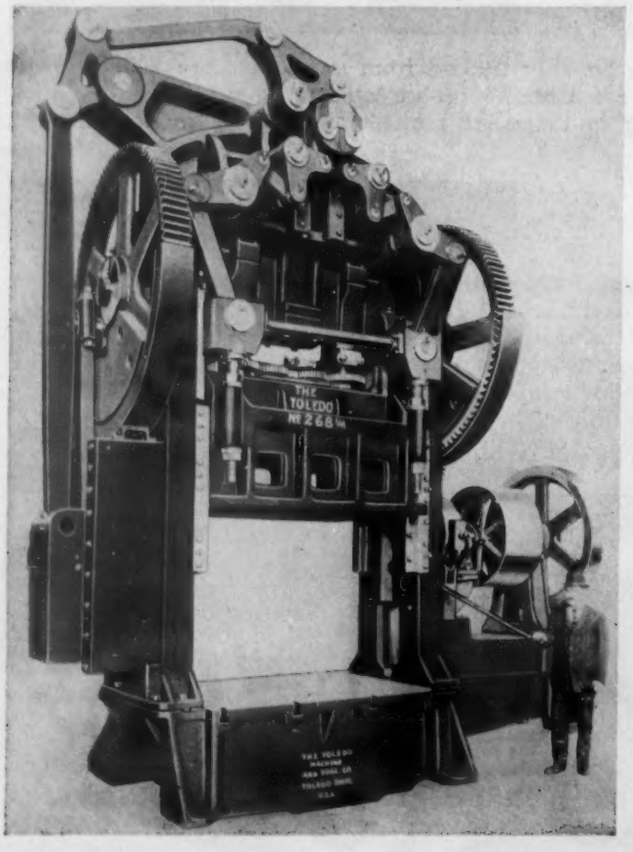
Automobile window control mechanisms, garden tool parts and a lawn mower made entirely of stampings were others of the many interesting exhibits viewed by the public, engineers and manufacturers. (Although the lawn mower did not arrive in time for the opening, there are qualified judges who swear that it it will do everything its designers intended).

Companies represented at the exposi-

(*Please turn to Page* 194)

Fig. 5—(Below)—A 1911 model toggle press built by E. W. Bliss Co., Toledo, O.

Fig. 6—(Below-right)—Equipment like this late model double-action Bliss toggle press made possible extreme advances in design and production



MESTA

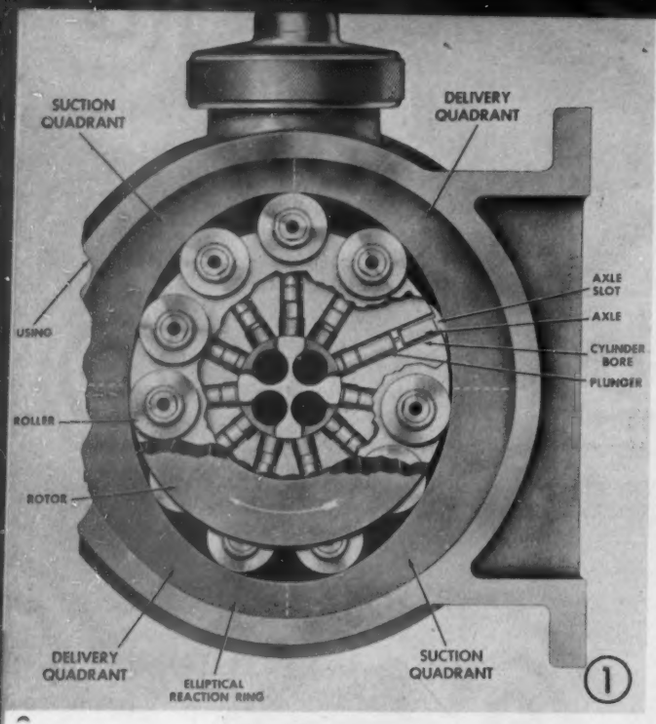
Cold Mills

ALL required tempers can be produced on Mesta High-Speed Twin Four-High Cold Skin Pass Mills. These mills feature new types of drives and control systems which maintain synchronization during acceleration, deceleration, and at normal operating speeds.

The Army-Navy "E" Flag with five stars flies over the Mesta Plant

MESTA MACHINE COMPANY *Pittsburgh, Pa.*

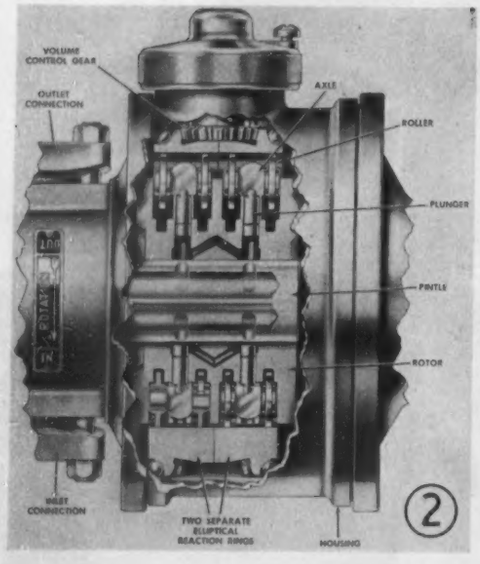
BUY VICTORY BONDS



Hydraulic Power

up to 5000 psi and 40 hp is provided by application of unusual design and construction principles in small, radial-type plunger pump

By A. H. ALLEN
Detroit Editor, STEEL



IN the field of hydraulically powered machinery and equipment, engineers have long sought a more compact power source suitable for continuous duty at pressures and horsepower beyond present ranges. Such equipment would eliminate the need for expensive and cumbersome intensifiers and accumulators (up to 5000 psi pressure), with their attendant disadvantages, and would also make more feasible the application of hydraulic power to drives in automotive, railroad and marine equipment.

A step in this direction is seen in the introduction of a small, compact radial-type hydraulic plunger pump embodying unusual principles of design and construction, which is capable of constant or variable delivery of hydraulic power up to 5000 psi and 40 hp. It is known as the Superdraulic pump, a product of the Superdraulic Corp., Dearborn, Mich.

Briefly, the pump, a radial type plunger unit, as explained, is arranged so that centrifugal force at speeds over 100 rpm maintains the plunger rollers in contact with an elliptical reaction ring. Plungers are fitted to cylinders in a rotor in one or more blanks of 11 plungers per bank. The rotor turns on a fixed central pintle which has suitable ducts and ports for directing the oil intake into those cylinders passing through two opposite quadrants of the stationary rings, which can be likened to cam rings, and also for directing the oil delivery out of those cylinders passing through the other two opposite quadrants. Reference to an accompanying sectioned view of plungers

(*Please turn to Page* 180)

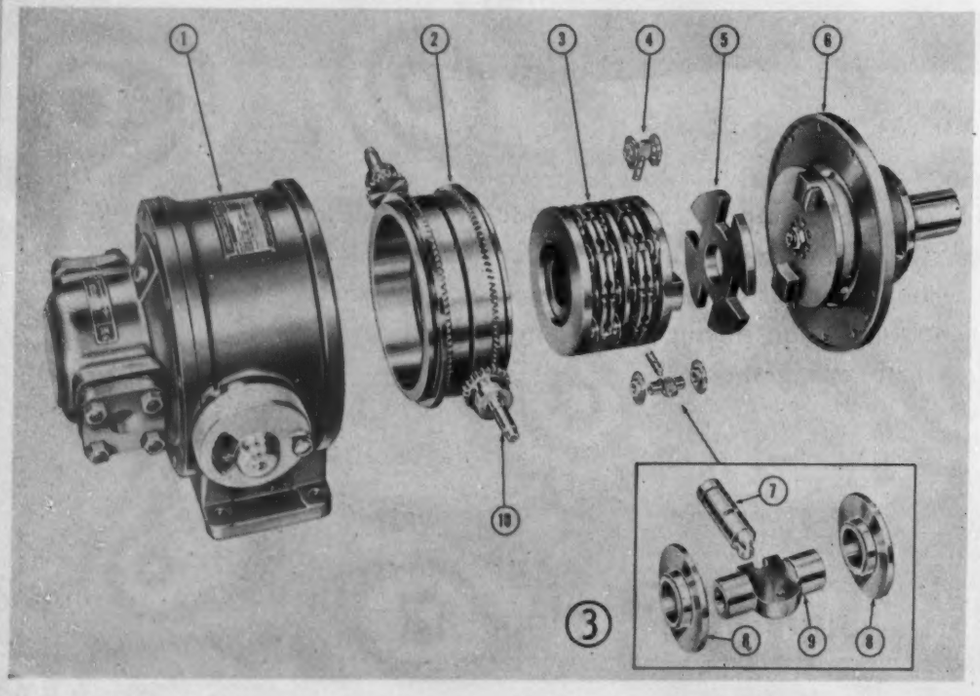
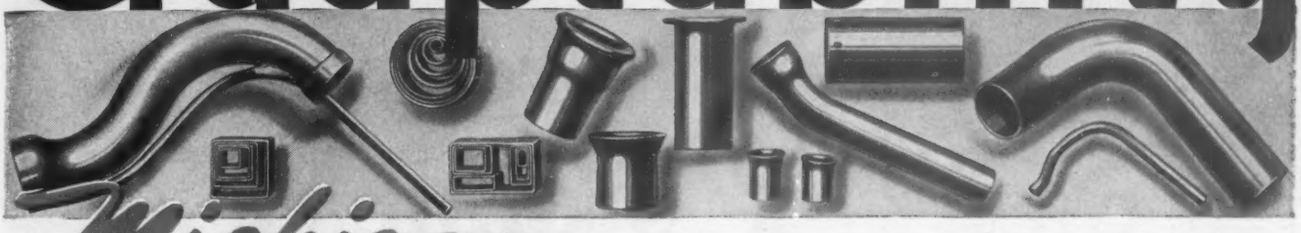


Fig. 1—Cross-sectional view shows arrangement of pump plungers and rings

Fig. 2—As shown here, each pair of parallel cylinders is in open communication by means of a drilled passage in the rotor

Fig. 3—Exploded view of the variable delivery pump. 1—Pump housing subassembly. 2—Elliptical reaction rings. 3— Double-bank rotor. 4—Plunger movement assembly. 5—Coupling disk. 6—Drive housing subassembly. 7—Plunger. 8—Rollers. 9—Axle. 10—Volume control pinion

Adaptability



Michigan Welded Steel Tubing

SIZES: ¼" to 4" O.D.
GAUGES: 9 to 22

Available in commercial mill lengths or cut to specified lengths, shaped and fabricated ready for assembly.

Michigan welded steel tube can be flanged, expanded, cold drawn, fluted, flattened, bent, coiled, upset, beaded, grooved, rolled, spun, threaded, tapered, and shaped to meet every manufacturing demand.

Engineering advice and technical help in the selection of tubing best suited to meet your needs.

Michigan STEEL TUBE PRODUCTS COMPANY

MORE THAN 25 YEARS IN THE BUSINESS

9450 Buffalo St. • Detroit 12, Mich.

FACTORIES: DETROIT, MICHIGAN and SHELBY, OHIO

DISTRIBUTORS: Steel Sales Corp., Detroit, Chicago, St. Louis, Milwaukee and Minneapolis—Miller Steel Co., Inc., Hillside, N. J.—C. L. Hyland, Dayton, Ohio—Dirks & Company, Portland, Oregon—James J. Shannon, Milton, Mass.—Service Steel Co., Los Angeles, Calif.—American Tubular & Steel Products Co., Pittsburgh, Pa.—Strong, Carlisle & Hammond Co., Cleveland, Ohio—C. A. Russell, Inc., Houston, Texas—Drummond, McCall & Co., Ltd., Toronto, Canada.

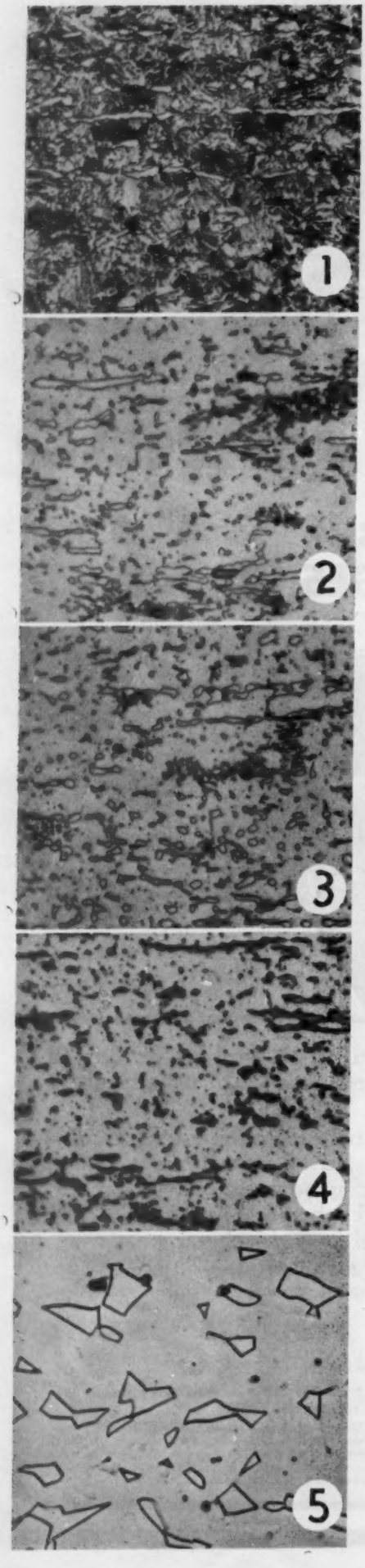
Precipitation hardening stainless STEEL

Alloy has three specific aging temperatures. It will harden uniformly throughout unusually heavy sections without difficulties generally encountered

BASIC composition of Stainless "W" (U. S. Patents 2,381,416 and 2,374,388) is so balanced as to insure, without the necessity of cold working, the approximate completion of the austenite to ferrite (martensite) transformation and the subsequent process of precipitation hardening. Typical analysis of this steel which has been released from war restrictions is announced by Carnegie-Illinois Steel Corp., United States Steel Corp., subsidiary, to be as follows: C 0.07, Mn 0.50, P 0.010, S 0.010, Si 0.50, Ni 7.00, Cr 17.00, Ti 0.70, Al 0.20. It is a heat-treatable stainless steel of the 18-8 type which makes available the high strength and corrosion resistance of 18-8 in all wrought and cast forms, regardless of size or shape.

Titanium is the most important element; it serves as the primary precipitation hardening element and a strong ferrite former. With all other elements properly balanced, the best range for titanium has been found to be 0.40-1.00 per cent. In melting the material, aluminum is added to the bath primarily as a deoxidizer; excess that remains in solid solution serves to augment the titanium in the precipitation hardening role. Carbon does not contribute directly to the precipitation hardening reaction, but controls the amount of soluble titanium that will be available for the reaction. Nitrogen also combines with, and thus immobilizes, the titanium. It also stabilizes the austenite and therefore should be controlled and held as low as possible (to residual amounts).

Remaining alloying elements, nickel, manganese, chromium and silicon, serve to control the austenite to ferrite balance; the first two elements are austenite formers while the later two are ferrite formers. It is believed that these elements, with the possible exception of nickel, do not enter into the precipitation hardening reaction. Columbium has been suc-



Photomicrographic studies of Stainless W show:

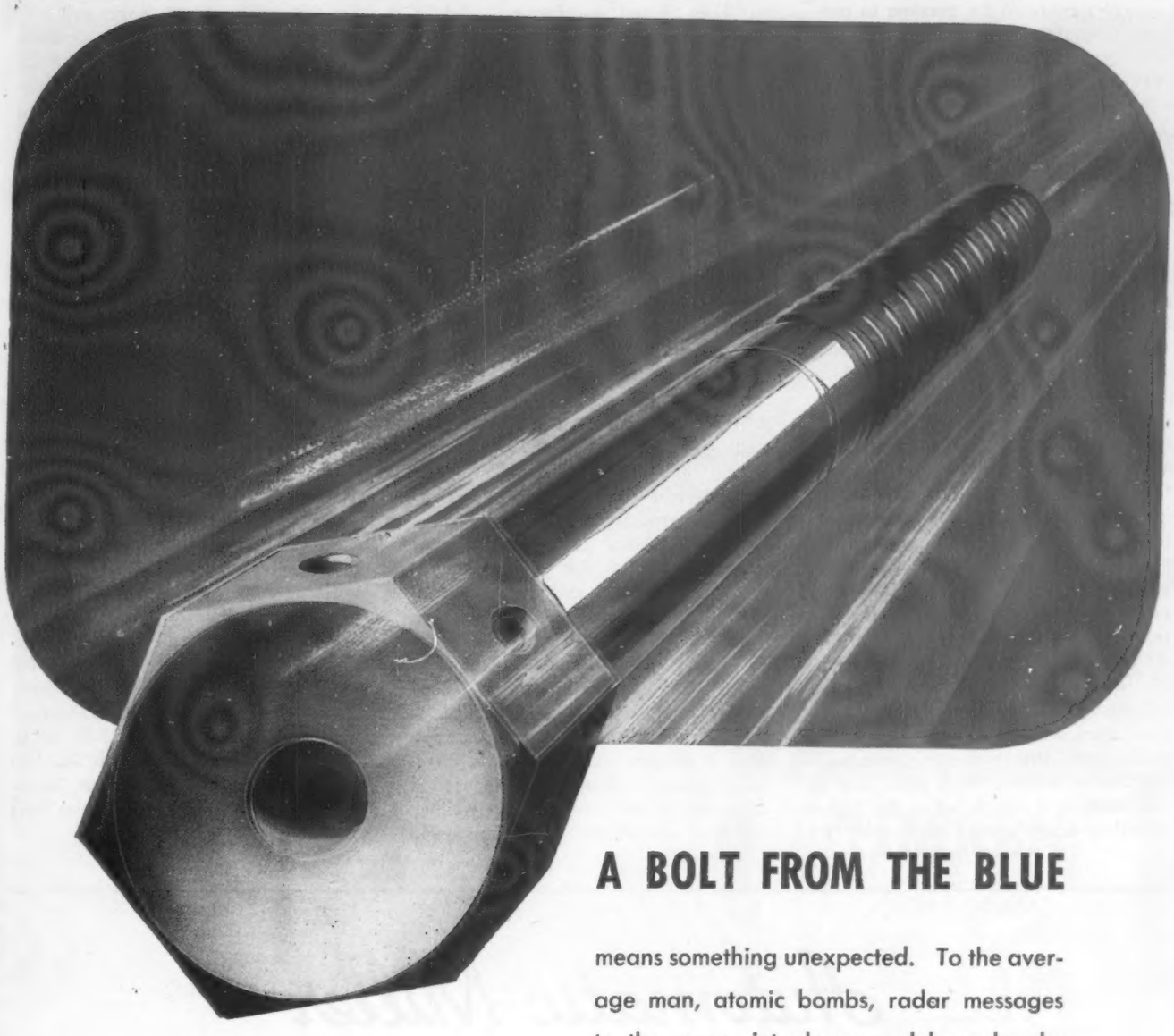
Fig. 1—Lamellar constituent resulting from ½-hr anneal at 1300° F

Fig. 2—Microstructure following ½-hr anneal at 1600° F

Fig. 3—Sample annealed ½-hr at 1600° F and aged ½-hr at 900 F

Fig. 4—Darkening of delta ferrite has occurred following a ½-hr anneal at 1600° F and aging for ½-hr at 1000° F

Fig. 5—Sructure following ½-hr solution anneal at 2200° F. All photomicrographs are at 1000X and were given an electrolytic NaCN etch



A BOLT FROM THE BLUE

means something unexpected. To the average man, atomic bombs, radar messages to the moon, jet planes and buzz bombs were bolts from the blue. On the other hand, there's nothing unexpected about the performance of CHANDLER cold wrought products. They always meet specifications in tightness, smoothness, strength, closeness and tolerance. Because we do only one type of work—cold wrought products—we do it extremely well, by hewing to accuracy, precision and service.

CHANDLER PRODUCTS CORP.
1491 CHARDON RD. CLEVELAND 17, OHIO

cessfully substituted for titanium to produce precipitation hardening.

In the annealed condition Stainless "W" ordinarily has a rockwell C of 22-28, a tensile strength of 120,000-150,000 psi, and a yield strength of 75,000-115,000 psi. By proper heat treatment the hardness can be raised to 39-47 rockwell C, the tensile strength to 195,000-225,000 psi, with yield strength of 180,000-210,000 psi.

Solution annealing serves to put the precipitation hardening constituents of Stainless "W" into solid solution in austenite, which upon cooling to room temperature transforms into ferrite, which is then supersaturated with the precipitation hardening constituent. Solution annealing temperature range begins at about 1200°F, which is 100°-200°F above the temperature at which the material begins to transform to austenite, and extends to approximately 2000° F. With increasing solution annealing temperature, hardness and yield strength of the unaged material increases slightly and passes over a peak at about 1700°-2000° F, while the corresponding tensile strength simultaneously reaches a minimum value at about 1600° F and then increases slightly with increasing temperature. Usually the minimum holding time at temperature is short, and on thin sections 5 min in all at the higher annealing temperature (1850°-1950° F) has been found satisfactory; slightly longer times are recommended for heavier sections where it is harder to determine when material has reached temperature.

Three Aging Temperatures

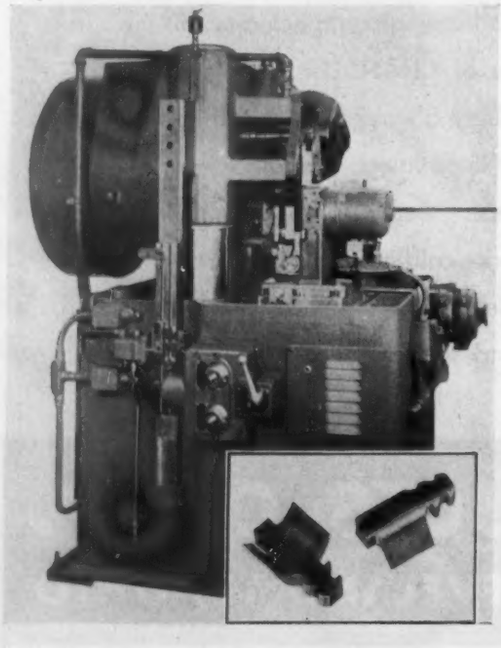
Aging consists of reheating, upon completion of the austenite transformation, to a temperature at which the precipitation hardening constituents will precipitate out of the supersaturated ferrite and impart the desired change of properties. Precipitation hardening takes place over the approximate temperature range of 500°-1050° F. Three specific temperatures are recommended for their different combination of properties. Of these, 950° F gives the maximum tensile and yield strengths, but with the lowest ductility; 1000° F gives a slightly lower tensile and yield strength with an improved ductility; aging at 1050° F results in the formation of some austenite which improves the ductility, but at some sacrifice in tensile and yield strengths.

It is reported that this steel can be rolled, drawn, forged, or pierced for tubing successfully in standard equipment and no difficulty will be experienced with warping or dimensional changes in the course of heat treating operations. Also, it exhibits considerably less directional properties than cold worked 18-8. It is readily fabricated by spot welding and high joint efficiencies can be secured by metallic arc, atomic hydrogen and heliarc welding operations, particularly when solution annealing followed by aging is employed as a post-welding treatment. Machinability, according to shop tests, is slightly better than that of austenitic 18-8 stainless steel. Unlike most other types of 18-8 stainless steel, Stainless "W" is strongly magnetic.

Preliminary commercial applications indicate its usefulness in those cases where hardness plus corrosion resistance is essential, as in cams and rollers in food handling and bottling equipment, bearings, and parts for valves subjected to service in the oil, chemical and food industries. Other applications involving high strength alone, or in combination with hardness and corrosion resistance, can also be filled successfully with Stainless "W," which is said to harden uniformly throughout unusually heavy sections without difficulties normally attendant upon quenching and surface hardening.

Details regarding the research and development work done in connection with this new stainless steel were presented before the annual meeting of the American Institute of Mining and Metallurgical Engineers in Chicago, Feb. 25-28, by R. Smith, E. H. Wyche, (now with Titanium Alloy Mfg. Co.), and W. W. Gorr, Metallurgical Engineers, Carnegie-Illinois Steel Corp.

Automatic Miller



Tool automatically mills and cuts off bar stock for turbine blades. Operator merely replaces exhausted stock

A NEW machine for automatically milling and rapidly cutting off parts from bar stock merely requires the operator to insert new bar lengths as they are exhausted. It is suited for the manufacture of hinge parts, pole pieces, turbine blades, molding, hardware and other parts. One operator can tend two or more of such machines, manufactured by Kent-Owens Machine Co., Toledo 10, O.

Illustration shows a setup for milling turbine blades. The crescent shaped bar stock is automatically fed against an end stop by a torque motor and then clamped hydraulically. The head has three cutter spindles. Form cutters on the two lower spindles form mill the blade as shown, (inset), and a saw on the upper spindle cuts the blade off to length.

After the piece is cut off by the saw and as the head returns to its upper position, the bar stock is unclamped, advanced into position by the torque motor for a new part and again clamped. All of these movements are continuous and automatic, requiring no attention from the operator. The head is actuated hydraulically and with proper adjustments any desired cycle or feed rate may be obtained.

A proper fixture and clamping jaws can be provided to accommodate various cross section shapes of bar stock. Further, the head can be furnished with a single spindle for simple cutting off operations or with a number of spindles for both milling and cutting off as in the example described.

AAF PHOTO

COPYRIGHT 1946 THE TIMKEN ROLLER BEARING CO.

— will the stratosphere open to air transport?

What's brewing is colossal!

Skyliners, for instance, with twice the speed, four times the range and ten times the load capacity of pre-war models. "Nothing now needed is beyond our grasp," aeronautical engineers say.

Many times, metallurgists of The Timken Roller Bearing Company have aided and abetted the brilliant engineering of the aviation industry. *Super-Steel,* created, developed and produced by the Timken Company, made possible today's turbosupercharger and the American jet propulsion engine. Other fine Timken steels have gone into propeller blades, fuselage frames, landing gear, cylinder liners, roller bearings, piston pins and other parts requiring the utmost dependability.

The ability to produce such properties in alloy steel comes from leadership in research. It comes from broad experience in producing special analyses. And it comes from special techniques in melting, processing and working alloy steels, practical only in a flexible specialty mill.

No other company has produced and applied alloy steels to so many difficult uses. Recent developments may enable us to help you make a better product at lower cost. Write Steel and Tube Division, The Timken Roller Bearing Company, Canton 6, Ohio. *Timken Bearings, Timken Alloy Steels and Seamless Tubes, Timken Removable Rock Bits.*

TIMKEN

Trademark Reg. U. S. Pat. Off.

Fine Alloy

STEEL AND SEAMLESS TUBES

METALLURGICAL DREAM COME TRUE! For the turbine wheel of a vital new turbosupercharger, the AAF required a metal which would withstand the red heat of 1500° Fahrenheit, while whirling madly at 24,000 r.p.m.

Many had tried to produce this metal. All had failed.

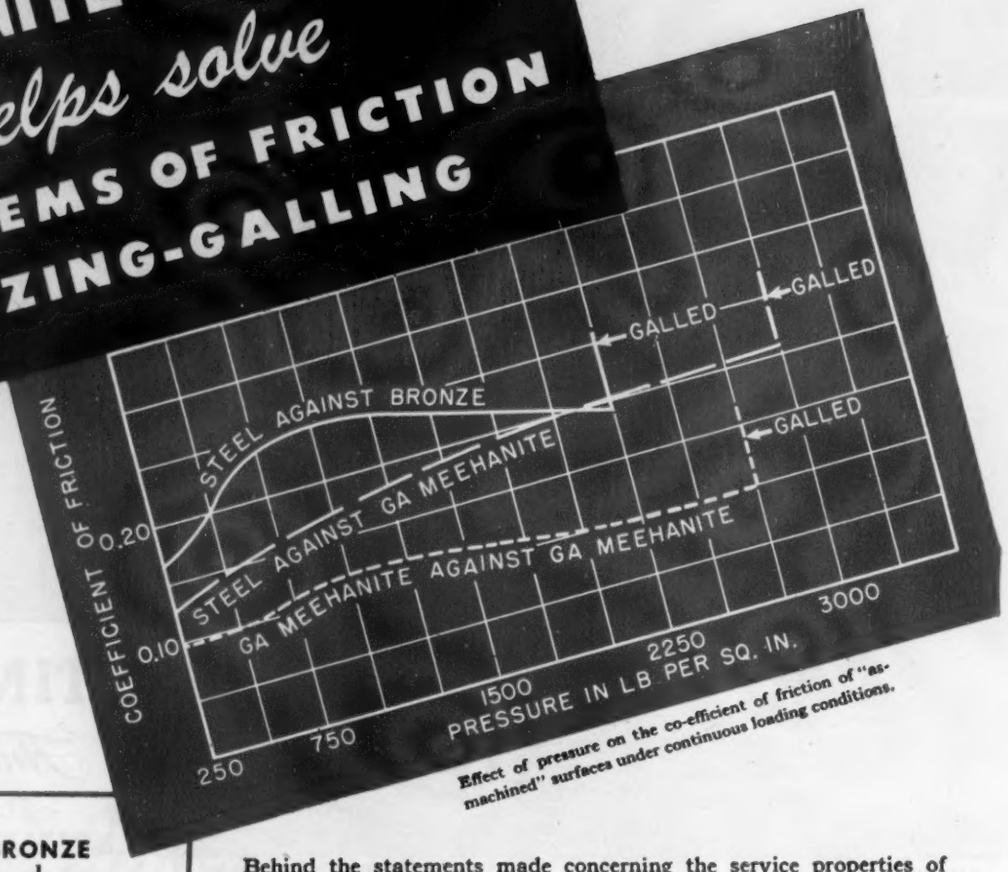
Then in a matter of months, from the laboratories of The Timken Roller Bearing Company came a magnificent new alloy steel. *Super-Steel!* Twice as strong at high temperatures as any other steel then in use. Now acknowledged the greatest development in alloy steel to come out of the war!

While only a few pounds of precious Super-Steel were required for each supercharger, a total of 12 million pounds flowed from Timken Company furnaces to supply our giant air fleet.

U. S. airmen, then behind supercharged engines, drove their planes 13,000 feet higher; soon after, controlled the air.

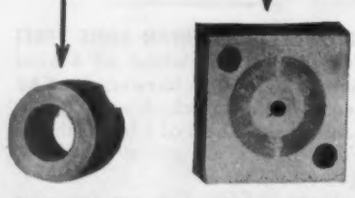
★ YEARS AHEAD — THROUGH EXPERIENCE AND RESEARCH

MEEHANITE RESEARCH *helps solve* PROBLEMS OF FRICTION SEIZING-GALLING



Effect of pressure on the co-efficient of friction of "as-machined" surfaces under continuous loading conditions.

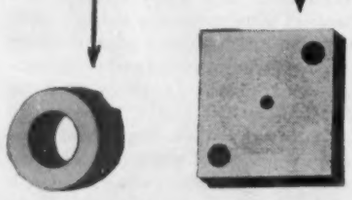
1 STEEL Against BRONZE



Rolled steel SAE 1035 containing 1.56 manganese

Navy M bronze containing 88% copper, 6% tin, 1.5% lead, 4.5% zinc.

2 GA MEEHANITE & STEEL



1 Appearance of bronze and steel bearing surfaces after test using "conditioned" steel to final pressure of 2,500 lb. p.s.i. Wear and galling evident on bearing surfaces.

2 Appearance of Meehanite bearing surfaces after test using "conditioned" steel to final pressure of 6,000 lb. p.s.i. No indication of wear on bearing surfaces.

Behind the statements made concerning the service properties of Meehanite Castings is always an accumulation of research and investigation. Such activities are a primary function of the manufacturers of Meehanite Castings.

The chart above is a result of extensive tests on the effect of pressure on rubbing surfaces under continuous loading conditions.

These investigations have revealed that the chief causes of metal pickup, seizing and galling are:

1 Incorrect structural constitution of the metals employed.
2 Rough or inaccurate machining.
3 Improper selection of surface finishes.
4 Inadequate clearances.
5 Overload such as is caused by poor alignment, etc.
6 Faulty lubrication.
7 Uncontrolled temperature conditions.
8 Careless "running-in" during the "break-in" period.

Meehanite Castings provide proper structural constitution through regulation of the micro constituents. In addition their machinability and constitution permit highly accurate machining and the attainment of the desired service. Their carefully regulated graphitic content contributes something to lubrication. These properties are responsible for the extensive use of Meehanite in machine parts requiring resistance to surface friction, sliding wear, pick-up and galling.

Write for Bulletin No. 17 "A Study of Friction, Galling & Seizing."

MEEHANITE RESEARCH INSTITUTE
Pershing Square Building
NEW ROCHELLE, NEW YORK

The war job of TUNGSTEN and MOLYBDENUM PRODUCTS

By M. H. McCLEMENT
Sales Engineer, Elmet Division
North American Philips Co.
Dobbs Ferry, N. Y.

ALTHOUGH tungsten and molybdenum products (hydrogen-reduced powder, wire, rod and sheet) are well known in the field of powder metallurgy, few people realize the important role they played in World War II in achieving final victory. Unlike the steel industry, where one figures in terms of tons, tungsten and molybdenum products are produced in kilogram and even gram lots. All machinery is of special design and the technique of operating this equipment is also highly specialized and very limited.

In order to produce a satisfactory product, especially in tungsten, it is necessary to start with a very high-grade and pure concentrate. The ideal concentrate analyzes approximately 72 per cent WO_3 with very little or no impurities such as molybdenum, arsenic, phosphorus, sulphur, silica and aluminum. Tungsten ore (Wolframite), nearest to meeting these specifications, comes from China. The concentrates of tungsten and molybdenum are first put through various purification and chemical operations in order to obtain a very pure oxide. This oxide, in turn, is placed in specially designed furnaces and reduced in a hydrogen atmosphere to pure metal powder. This powder is pressed into bars and then sintered in a hydrogen atmosphere and subjected to very high temperatures. The resulting ingots are then either rolled into sheet, swaged into rod, or drawn into wire down to less than 0.001-in. in diameter.

Wolframite Flown Out

Prior to the outbreak of hostilities all Chinese Wolframite was transported over the Burma Road. When the road was closed, the Army Transport Command, realizing the vital importance of this material, took the necessary steps with the result that the tungsten concentrate was one of the first commodities to be flown out "over the hump." In the case of molybdenum transportation problems were not nearly as acute, as we had abundant reserves in this country.

On Dec. 7, 1941, there were only six companies producing both tungsten and molybdenum products and two producing tungsten alone. The output of these companies was used primarily in the incandescent, radio and automotive contact fields. During the first part of 1942, the term "radar" was shrouded in secrecy, and it was almost treason to discuss any phase of it.

Consequently, in the late spring of 1942, the tungsten and molybdenum industry was suddenly surprised by a tremendous demand, for which it was totally unprepared. The members of this industry were hastily summoned to Washington and presented with the true picture. This was the start of one of the most harmonious and co-operative working teams of the war. Industry, the armed services, the War Production Board, and various representatives of our Allied governments, all got their shoulders behind the wheel. The tungsten industry had to be expanded eightfold and the molybdenum almost fifteenfold.

One of the biggest handicaps was the lack of skilled supervisory personnel with the result that only one new company entered the tungsten field. All existing plants were expanded to their limits, and through the concentrated efforts of everyone involved the expansion goal was reached in record breaking time and no serious setback was encountered by any of the claimant agencies. This achievement is all the more remarkable when one considers the various demands placed on the industry.

It was imperative that enough tungsten and molybdenum wire, rod and sheet be produced to supply the Signal Corps with component parts for all transmitting, receiving and rectifier tubes. The demand for incandescent lamps to keep factories throughout the nation operating on an "around the clock basis" was excessive; at one stage of the program serious consideration was given to a nation-wide blackout due to the shortage of tungsten wire for incandescent purposes. Fortunately for all, this emergency never arose. Also, it was absolutely essential that the Army Air Forces receive large quantities of tungsten rod for the manufacture of spark plugs for high altitude flying.

The industry was further burdened with heavy demands for tungsten contact points to keep transportation moving to and from war plants, for tungsten electrodes used in the shipbuilding and landing-craft programs, and tungsten carbides for cutting tools. The industry also supplied vast quantities of tungsten and molybdenum products for the nation's No. 1 project, the "Manhattan District Engineers" or atomic bomb.

It has now been disclosed that a new armor-piercing projectile composed of a special tungsten carbide greatly contributed to the shortening of the European conflict. Furthermore, the large demands should not be overlooked, which were made by England and Russia at the start of their expansion program, as their requirements far exceeded their capacities.

This industry, having played a small, but a very vital part in the war effort, has a just right to be proud of its record.

Fig. 5 — Here is an example of sensible "streamlining" as applied to a 10 x 20 in. sensitive, precision toolmakers lathe. Recent redesign of this machine has involved "tailoring" of controls for utmost operating convenience

Field for Lathes Broadens

(*Continued from Page* 121)

job as it was doing when we studied its design and operation.

This machine primarily is for manual or semi-automatically controlled first and second operation work on such things as gear blanks, straight and flanged bushings and shafts having one or more steps. It swings 15 in. over bed; 8 in. over front slide; and 7½ in. over rear slide. The front slide is 7 in. wide and can travel 4 in. The rear slide is 7¾ in. wide and can travel 3½ in. Base center distance is 18 in. Spindle speeds range from 75 to 3000 rpm.

Its front carriage can be equipped either for hand return of longitudinal and transverse movement of power-driven feed; or for semi-automatic cycle incorporating power driven longitudinal feed toward the head stock and rapid traverse return. The slide has rapid traverse "in", at 100 in. per min; and power-driven rapid traverse return to starting position. The front carriage can pass the tailstock base, it being possible to clamp that base anywhere along the rear ways of the bed.

The rear carriage, for facing and necking work, has its own motor and an electrically controlled cycle. Feeds can be changed through pickoff gears mounted in the carriage housing. It is provided with power rapid traverse and return. Because of its independent motor drive, it requires no mechanical tieup whatsoever with the front carriage.

Headstock lubrication is unique in that oil is atomized, the resulting mist doing the job by circulating around the moving parts. Only a very small amount of oil is used but tests show cooler running even at 3000 rpm than with conventional oiling systems.

When it is desirable to stop the spindle electrically, an ac motor with plugging relay is used. Stopping without jolt within a momentary space of time is thus possible. When a wide variety of work must be handled, a constant speed motor is recommended, along with proper range of spindle speed changes. In that case, a large multiple disk clutch is mounted in the headstock and spindle control is by lever at right of front carriage. An automatic spindle stop also can be furnished, this operating either from front or rear carriage—depending which "checks in" last at its starting position.

Still another alternate headstock drive involves a variable speed dc motor having range of 4 to 1 (or more) and provided with dynamic braking. Main drive motor, pump motor, and—in the event that direct current is used—a motor-generator set, are all housed in the cabinet base of this machne. Power is transmitted to the first headstock drive shaft through a five-strand multiple vee-belt, thence to spindle back gear shaft through pick-off gears, and from back gear shaft to spindle through wide helical gears.

Controls for the motors just mentioned; also front and rear carriage controls; indication light; and the feed motor; all are situated above the front gear box at headstock end of the machine. Starting, stopping and "inching" controls for both carriages, reversing control and potentiometers for controlling spindle speed in relation to front or rear carriages (this last only on direct current machines) are grouped in a box at the right of front carriage. One lever, adjustable to suit the operator, positions and locks the tailstock quill. This contains a "live spindle" running on preloaded ball bearings.

This machine emphasizes the modern trend toward massive slides with generous provision for mounting a wide variety of tools—multiple tools when desirable. Furthermore, it is illustrative of a basically standard machine which at final assembly can be modified to suit the particular work for which it is purchased. This is in contrast to the older policy of building into a machine all sorts of gadgets which in numerous instances never were used and so represented useless overhead.

Mention of modification of basically standard machines brings us logically to consideration of the Uni-Matic, shown in Fig. 3, by which this principle can be carried out even to a greater degree. After careful study of this new creation, I am inclined to classify it as a highly adaptable "machine tool system" rather than as just a new kind of lathe for production turning, facing and boring.

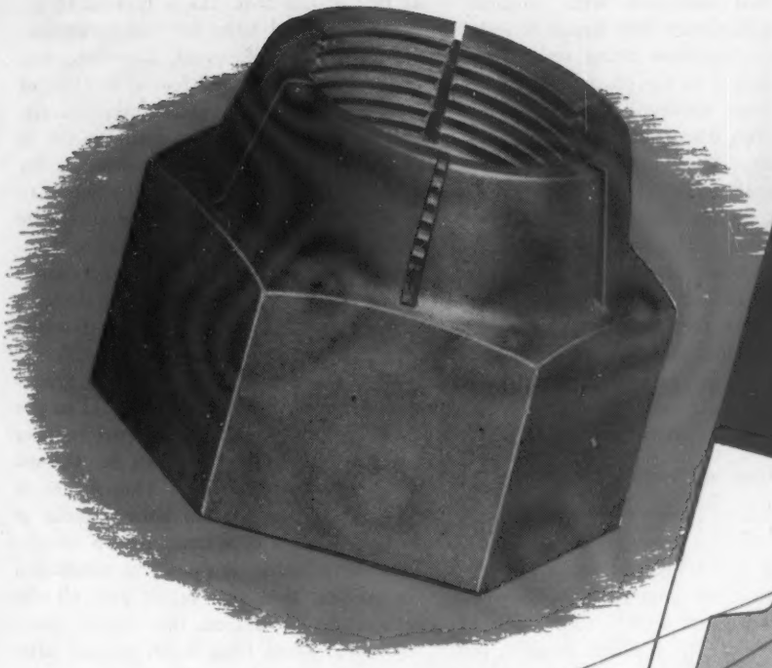
What might be called the fountain structure of this machine consists of a reasonably conventional base and headstock embodying motor, change gears and associated mechanism for driving and controlling the spindle. The rest of the machine, which is assembled on this base to suit the work, consists of from one to three devices which the Monarch people call Uni-Mats. One of these is shown in Fig. 4.

Heavy-Duty Compound Rests

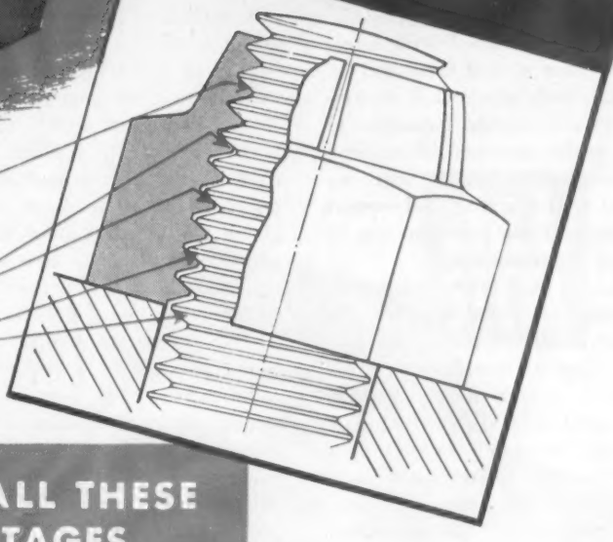
These units will be described as individually motored heavy duty compound rests. Each ordinarily is equipped with an electrically controlled ac motor which traverses the individual slide at 100 in. per min until the slide automatically is slowed down to a predetermined working feed rate over whatever remains of its total travel of 4 in. At the termination of its cutting traverse, the slide either immediately returns to its starting point, or can be made to dwell for a given number of seconds before its return. The three adjustable micrometer stops at the end of the unit control the traversing and feeding phases. Change gears make it possible to get working feeds ranging from ½ to 13 in. per min on the single-purpose unit.

The unit can also be equipped with dc motor drive, in which case the top speed of the motor gives the standard 100 in. per min rapid traverse. Feed rates during the working phase of the cycle are attained by low speed operation of the motor under electronic control.

The units are of two types, (See Fig. 4) one giving tool relief; the other having a solid top slide. As the tool relief slide is about to begin the cutting phase, it moves 0.031 in. closer to the work—



HUGLOCK NUTS by "National"



The UPPER threads of the Huglock nut press inward against the bolt.

The remaining threads of the Huglock nut have slight clearance at their lower flanks and frictional contact on the load-carrying flanks.

The lock nut WITH ALL THESE ADVANTAGES . . .

1 *One-piece construction*—reduces assembly time and avoids possible failure to install supplemental locking medium.

2 *Self-locking action*—the Huglock Nut grips the bolt threads and maintains locking effect, whether seated or not, on the load-carrying flanks of the threads.

3 *Axial thread play eliminated*—Huglock Nuts are vibration-proof and shock-proof.

4 *Thread load is distributed* over all the threads of the nut, instead of being concentrated on the few bottom threads.

5 *Maximum thread shear strength*—full strength of the most modern 180,000 lb. tensile alloy bolt will not strip threads in nut. (Compare this with other designs.)

6 *All metal construction* permits applications involving high temperatures, oil or other types of moisture. Self-locking is maintained at high temperatures.

7 *Easily installed*—Huglocks start freely and may be tightened rapidly by standard hand or speed wrenches.

8 *Economical to use*—cotter pins, lock washers, key plates, jam nuts or other secondary locking devices are completely eliminated.

9 *Re-usable*—repeated removal and re-use on the same bolt or a similar bolt will not destroy the locking action.

10 *Controlled preset torque values* are built into Huglocks, insuring the vibration-proof results visioned in your engineering designs.

U. S. Patents 2290270, 2333290, 2337797. Other Patents Pending

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a slight internal adjustment making it do this in either direction. At the end of the cutting phase (at the close of the dwell, if any) the tool is snapped 0.031 in. clear of the work, thus preventing scoring during the back stroke.

The only operating—or "nerve" connections—between the Uni-Mats and the machine on which they are mounted, are the armored cables which carry the control circuits. The electronic equipment is housed in the separate control cabinet which can be seen behind the headstock in Fig. 3.

Several kinds of timing devices can be employed to maintain the working relation between the cycle of one of the Uni-Mats and the one or two others used with it. After the micro switches have been positioned to control a cycle, the slides can then be retimed with reference to each other so that there will be no idle time. Such elimination of nonproductive time is highly important in interrelated cyclic operation of modern, high speed machine tools. The units can be positioned to give perfect tool support on work ranging all the way from 1 to 12 and 16 in. in diameter.

For low speed, high torque operations, spindle speeds up to 1000 rpm are provided. When medium speed, medium torque operations are involved, top speed of 2000 rpm is recommended. A range having top speed of 3000 rpm is standard for high speed, low torque work. Through special engineering, speeds up to 5000 rpm are possible under certain conditions. It is possible to attain 3000 rpm from a "standing start" in slightly more than 1 sec, and by "plugging" an ac motor, the spindle can be stopped from the same speed in the same short space of time. This is important on small parts.

Monarch engineers are giving thought to various special applications of Uni-Mats in building up entirely special machines for mass production operations. We were shown, for example, sketches of long bed machines with multiple heads, and machines with heads at right angles—the Uni-Mats being set in any way best suited to the particular cut involved. Such unit-type lathe construction has been discussed theoretically for many years. Now at long last it has become an actuality.

In winding up this report by a one-time lathe hand who has been privileged to get up-to-date once more on turning machines and methods, two more machines deserve mention. One is a 10 x 20 in. precision tool maker's lathe depicted by Fig. 5. In overall, streamlined appearance this machine resembles a popular previous model.

Operating and Servicing Improved

A number of improvements have been made, however, principally in the direction of operating and servicing convenience. It no longer is necessary to change end gears to get full range of feeds and threads. A single lever at the front of the gear box shifts from belt drive, giving 50 feeds, to end gearing, giving 60 threading pitches. The electrical equipment in the base now is mounted separately from pumps, etc., and switches and connections for lead screw reversing, now are grouped conveniently in one box at the tailstock end.

Leadscrew, cross feed screw and compound screws are hardened and ground. Light metal alloys have been used instead of cast iron in a number of parts. A noteworthy feature of this machine as well as of the others previously described, is the built-in tachometer in the headstock. This does away with computation and speculation on spindle speeds by giving direct reading thereof.

And last but not least in the parade of new machines which we viewed in the course of our studies of modern methods of metal turning, was a lathe designed especially for mold makers. This machine, shown in Fig. 6, may at first glance look like a typical 12 in. swing universal lathe for tool room use. Closer study will reveal, however, that it has some unusual features. One of these is an "adjustable lead screw variating mechanism" which can be set to "build into a mold", compensation for the shrinkage of the material which is to be molded. Even though the shrinkage may be only 0.001 in. per in., the variator can be set so that threads chased in the mold will compensate for that.

Molds often require various internal and external milling operations. To allow these to be carried out without breaking down the setting of the mold in the lathe, this machine has a speed reducer on its headstock which can be thrown into action as needed. This makes it possible to revolve the lathe spindle at speeds as slow as a fraction of a revolution per minute. It should be mentioned in passing that this lathe, and all the others dealt with in this article, have flame-hardened beds finish ground after this surface hardening treatment.

The modern industrialist insists on a motor car which starts when he "steps on the starter". He would be most impatient if he had to stand around for 20 min or so waiting for a boiler to get up steam—as used to be the case back in the days of the famous Stanley Steamer.

However, if he has lathes in his plant of the era of the Stanley Steamer (and there are plenty of them still in use), the operators of those machines are spending as much time—company time—each day getting these machines started as used to be spent in getting a steam automobile in condition to chuff down Main Street. There is no profit in that.

Modern lathes such as I studied at Sidney are ready for business the moment the starting button is pushed. Even if they were not infinitely more convenient, faster and more accurate than the old model machines, their "self-starting" ability alone would account for a great deal more output and much better satisfied operators. I speak from long experience with older type machines, which makes me keenly appreciative of the numerous advantages of the new model lathes.

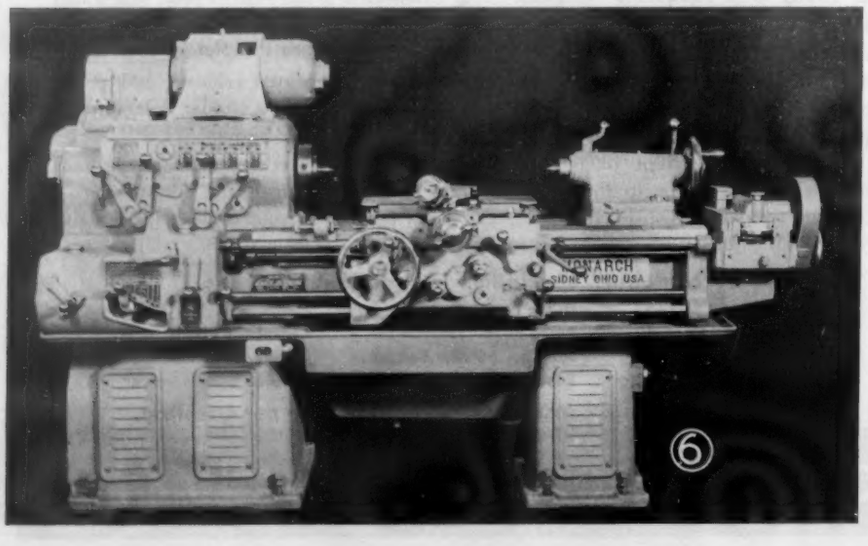

Fig. 6—This toolroom lathe, designed especially for moldmaking, has a lead screw variator providing compensation for shrinkage of material to be molded. Attachment on headstock gives ultra-low spindle speeds when milling is to be done on molds in this lathe

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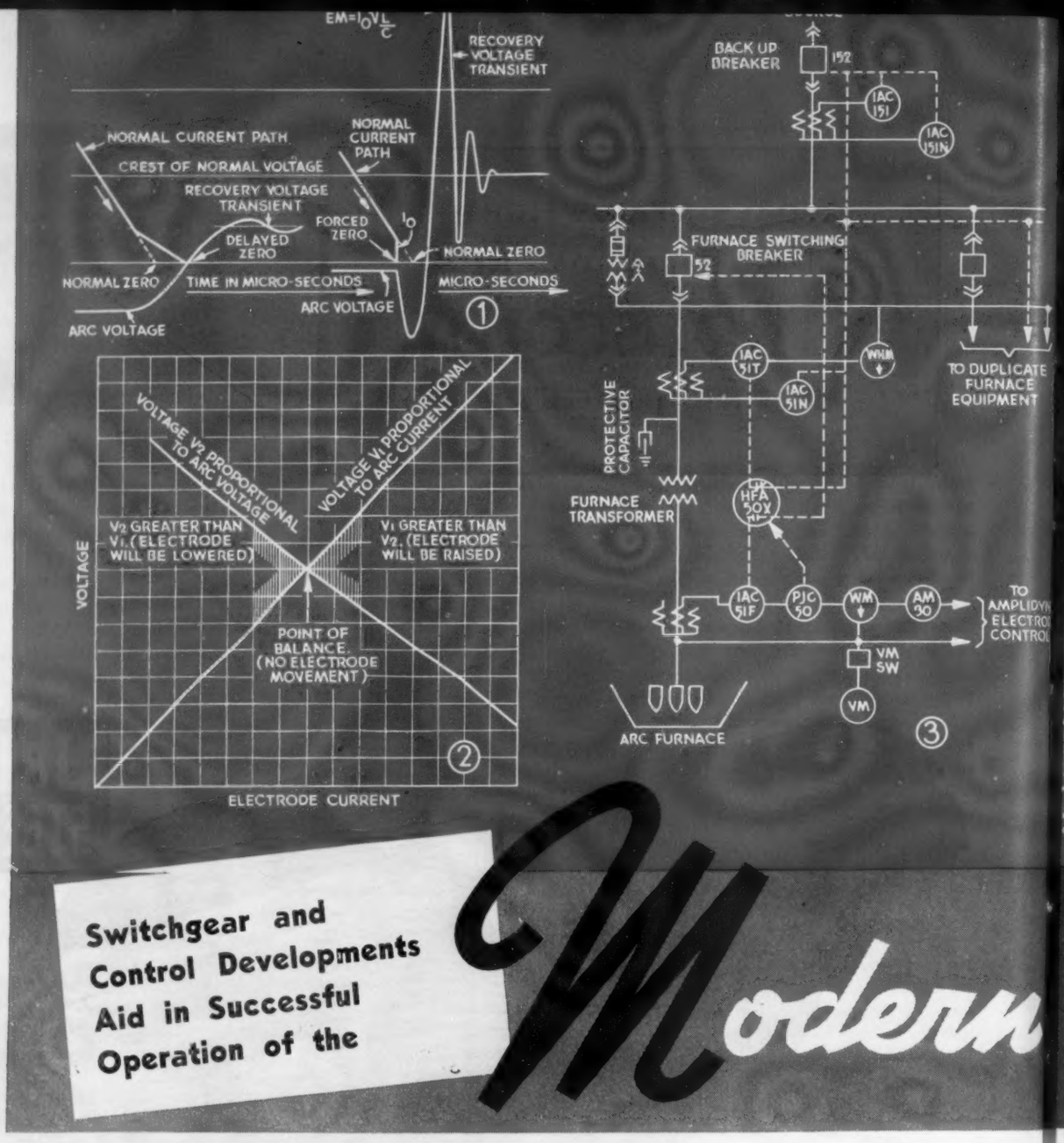


Switchgear and Control Developments Aid in Successful Operation of the Modern

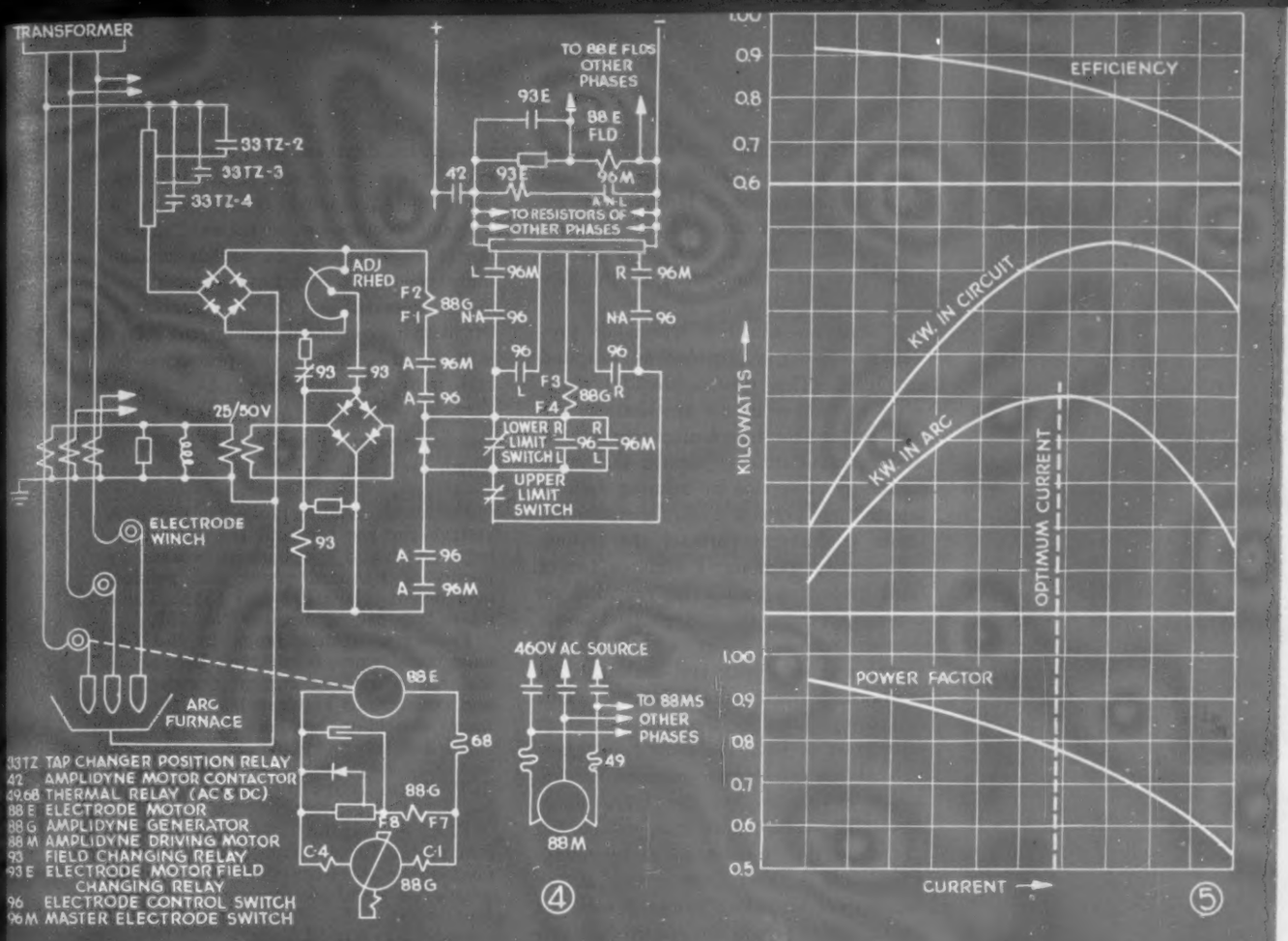
SUCCESSFUL operation of metal-melting arc furnaces is dependent to a large degree upon efficient, well coordinated switchgear and control. Recent developments which have contributed much to the design of such equipment are the magneblast power circuit breaker and the amplidyne generator.

Switching and Protective Gear: One of the important problems encountered in operation of arc furnaces has been the maintenance of oil circuit breakers used for switching furnace transformers. Such switching breakers are subjected to much more frequent operation than breakers in most other types of circuits. They are called upon to repetitively open currents varying from short-circuited electrode to transformer magnetizing values and in addition, in some installations, to act as fault interrupters if faults should occur in the high voltage circuit.

Such repetitive operation results in accelerated deterioration of contacts and breaker-operating mechanism parts, carbonization of the oil, and high transient voltage stresses on equipment insulation. This means that in order to maintain its normal efficiency as a fault interrupter, the breaker must be inspected and serviced and the oil processed or changed at relatively frequent intervals resulting in high maintenance costs and undesirable shut downs of the furnace.

Repetitive high transient voltages also tend to reduce the life of equipment insulation. These difficulties are overcome by two of the salient features of modern furnace switchgear; the magne-blast power circuit breaker for furnace switching and the separate backup power circuit breaker for fault interruption.

The magne-blast power circuit breaker in standard, removable-element, metal-clad switchgear is an air break device that avoids both the inconvenience and the hazard of oil. Its contact and mechanism parts are designed to withstand repetitive operation without frequent inspection and replacement of parts. Being mounted in a vertical-lift, removable-element, metal-clad switchgear unit, the breaker is easily accessible for such inspection and maintenance as is necessary. By having a spare removable element available, inspection and maintenance can be carried on with no interruption to furnace operation. This type



n arc furnace

By. W. N. GITTINGS
Manufacturing & Engineering Divisions
General Electric Co.
Philadelphia

Fig. 1—Comparative characteristics of magne-blast and oil circuit breakers. Note low recovery voltage transient for the new breaker

Fig. 2—Graphic representation of relation between arc current and arc voltage components of amplidyne generator control voltage

Fig. 3—Single line diagram of standard switchgear for arc-type melting furnaces

Fig. 4—Schematic diagram of amplidyne arc furnace control system

Fig. 5—Characteristic curves of a typical arc furnace

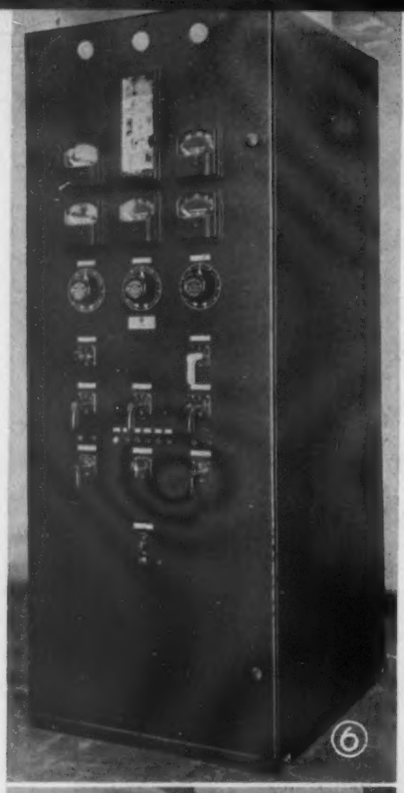
of switchgear is illustrated in Figs. 8 and 9 on page 148.

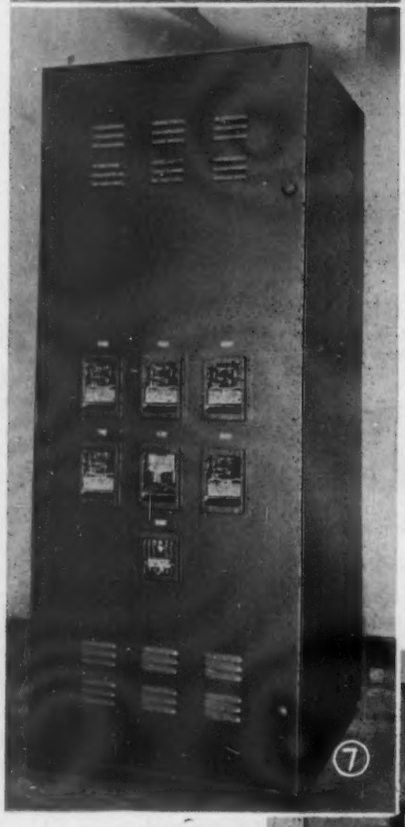
Another characteristic of the magne-blast breaker, which makes it especially suitable for furnace switching, is its low recovery voltage when interrupting transformer magnetizing or normal load currents. A graphic comparison of the recovery voltage characteristics of magne-blast and oil circuit breakers is shown in Fig. 1. This is an important advantage since normal furnace operation involves frequent interruption of transformer magnetizing current.

A separate fault-interrupting or backup breaker to service a group of furnaces, along with associated protective relays, meters and instruments, is illustrated in Fig. 3.

With this arrangement, the backup breaker is selected primarily with a view to providing adequate fault protection. It may be any type having sufficient interrupting capacity to clear maximum short circuit currents available from the supply system. It is normally closed and is, therefore, not subjected to frequent operation and can be maintained economically as an efficient fault interrupter.

The furnace switching breaker is selected primarily on the basis of its ability to withstand repetitive operation under normal load, short circuited electrode, or transformer magnetizing current with minimum maintenance.





Its interrupting capacity need only be sufficient to successfully interrupt the relatively low values of fault current resulting from short circuited furnace electrodes or short circuits on the low voltage leads from the transformer to the furnace.

A well co-ordinated system of protective relaying is provided as indicated in Fig. 3. This system provides maximum protection to the transformer, the furnace, and the intervening connections. At the same time it assures maximum continuity of service by insuring definite selectivity of protective relay operation for faults at different parts of the system.

Generally speaking, a high degree of fault protection cannot be provided on furnace circuits by conventional overcurrent relays without a considerable sacrifice in selectivity and the attendant unnecessary interruptions of service. This is accounted for by the fact that short circuits at or near the secondary terminals of the transformer produce a wide range of currents in the high-voltage circuit depending upon the voltage tap at which the transformer is operating. Frequently a dead short circuit at the transformer secondary terminals with the lower voltage taps in use will produce primary currents of a lesser magnitude than one produced by short-circuited furnace electrodes with higher voltage taps in use

It is evident, therefore, that conventional overcurrent relays connected in the high voltage circuit cannot be relied upon to provide adequate protection against all transformer secondary faults without risking false tripping of the furnace breaker by short circuited furnace electrodes when operating at higher voltages. Since short circuited electrodes are a frequent occurrence in normal furnace operation, especially on higher voltage transformer taps, such false tripping cannot be tolerated and the only alternative left with conventional overcurrent relays is to sacrifice transformer protection by high settings on the relays.

These difficulties are avoided by the protective relay system shown in Fig. 3 which provides:

Protection against faults on the high voltage furnace bus and the conductors between it and the backup breaker by means of standard phase and residual overcurrent relays 151 and 151N. These relays trip backup breaker No. 152.

Protection against faults in the furnace transformer, connections between it and the secondary current transformers and connections between it and the furnace switching breaker by means of short time characteristic overcurrent relays 51T and residual overcurrent relay 51N. These relays trip backup breaker No. 152.

Protection against persistent overcurrent in the furnace from such causes as jammed or short-circuited electrodes by means of standard time-curve overcurrent relays 51F. These relays trip furnace breaker No. 52.

Relays 51T and 51F are induction-type relays equipped with wound shading coils and shading-coil transformers, the secondaries of which must be short circuited in order that the relays may develop torque. Contacts of auxiliary relay 50X provide the means of short circuiting these shading coil transformers.

(*Please turn to Page* 186)

Fig. 6 — Arc furnace control and regulating unit showing operator's panel

Fig. 7 — Special protective relays mounted on rear unit greatly improve operation

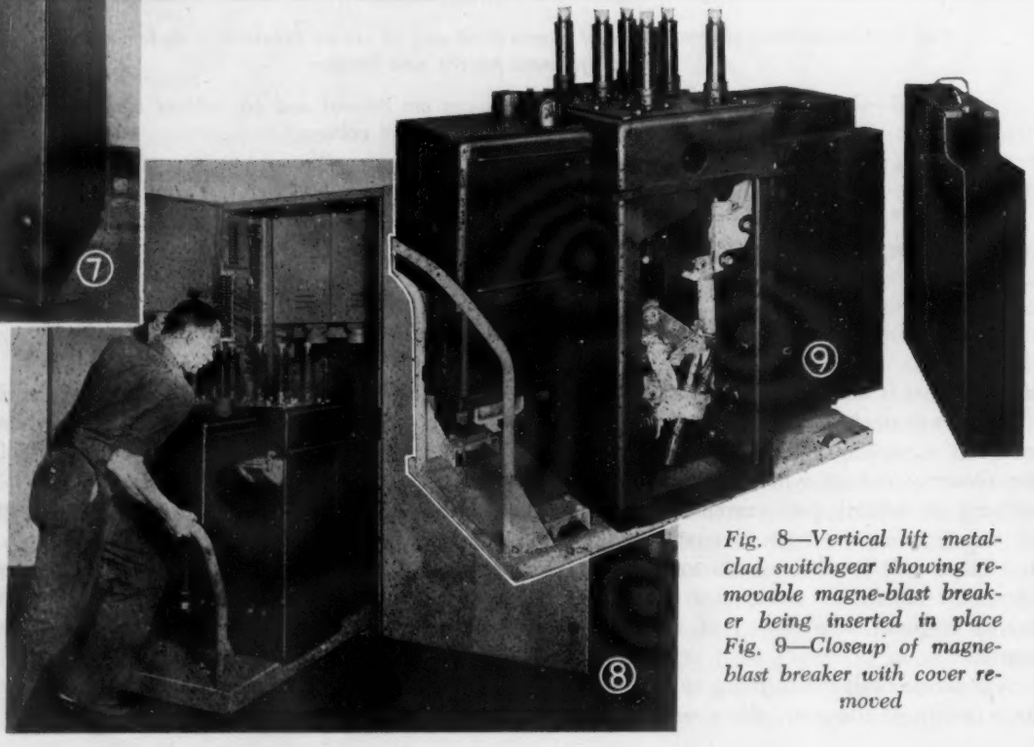


Fig. 8—Vertical lift metal-clad switchgear showing removable magne-blast breaker being inserted in place Fig. 9—Closeup of magne-blast breaker with cover removed

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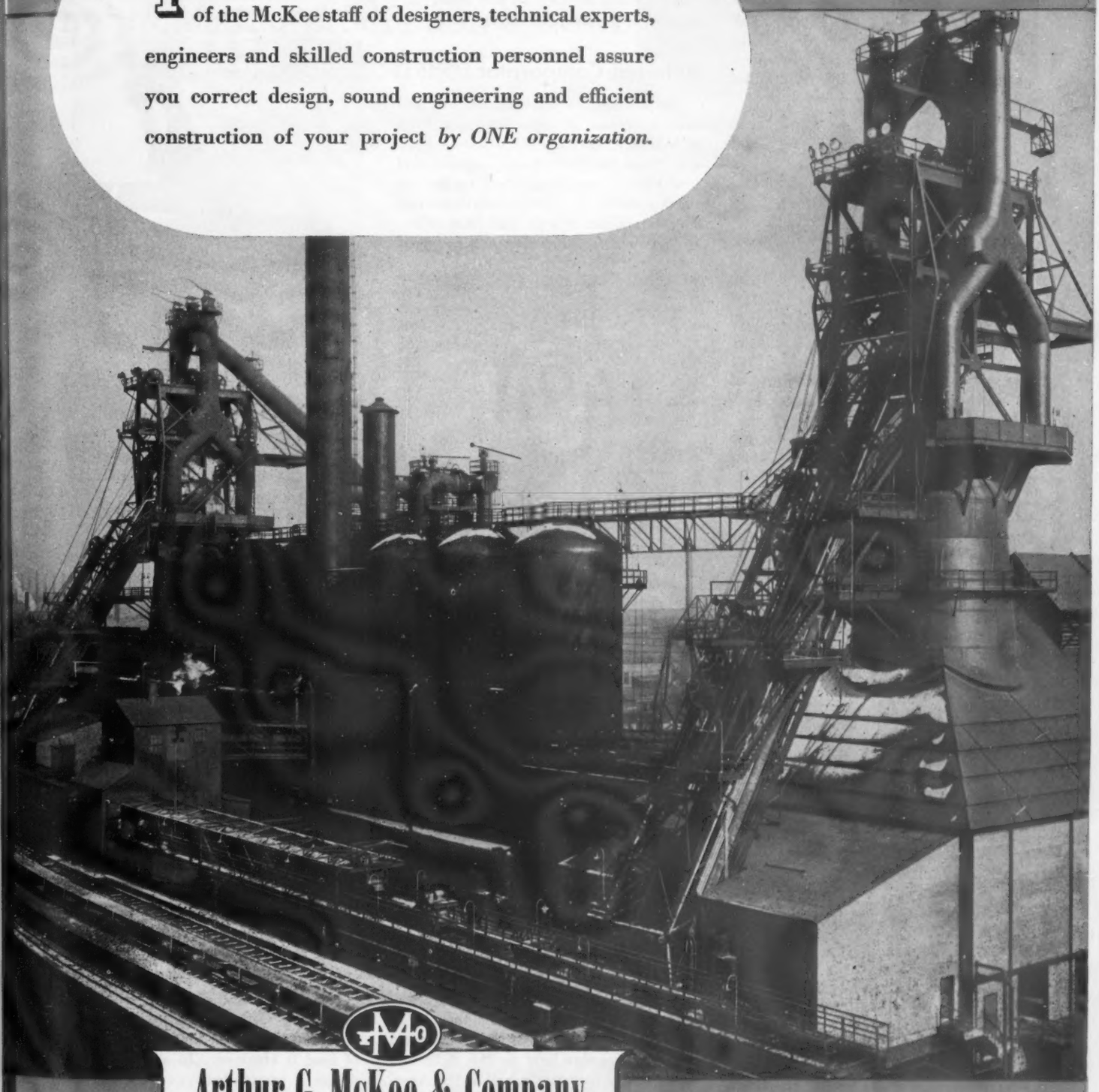

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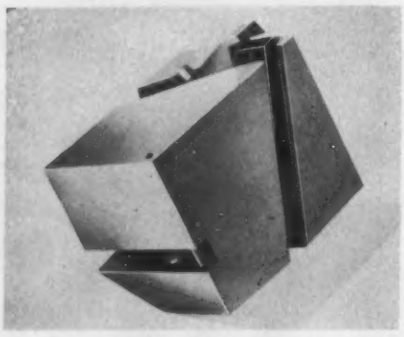
Carbide Bladed Cutter

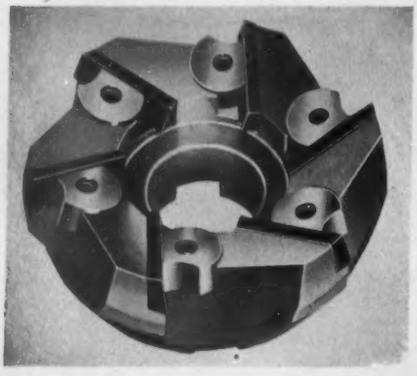
A face mill with removable solid carbide blades has been developed by Beaver Tool & Engineering Corp., 2850 Rochester road, Royal Oak, R-1, Mich. These blades are held in place by quick acting lock wedges at positive fixed radial



rake angle of 15°, but they can be ground to give a wide range of angles both positive and negative.

A grinding block is provided for use in sharpening the blades in a surface grinder equipped with magnetic chuck. This obviates tying up the cutter body while sharpening. A duplicate set of sharp blades can in the meantime be in use in the cutter. Blades are reset exactly after grinding by means of a dial indicator, the whole operation of removing, grinding and resetting requiring only a few minutes.

Blades can be reground as many as 125 times in the case of the larger sizes

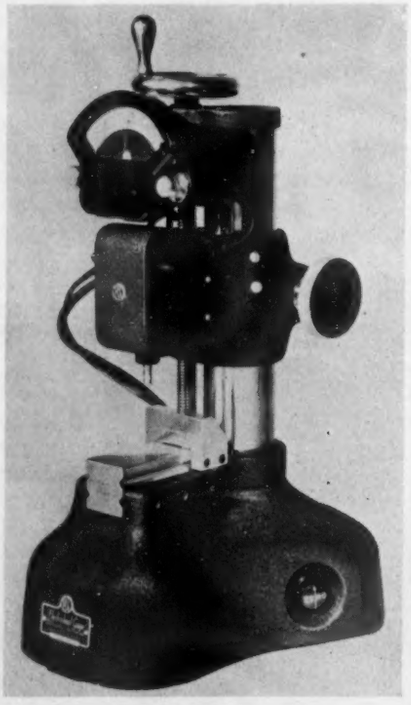


of cutters. When they become too short for the larger ones, they can progressively be used in those of smaller and smaller size. The stubs which eventually remain, can be used on single point tools — thus achieving 100 per cent use of the carbide. Blades of Braecast, Tantung, high speed steel, etc., also can be used effectively in these cutters, which in sizes larger than 4 in. diameter are provided with keyways so that they can be used as side mills.

Steel 3/4/46; *Item No.* 9054

External Comparator

To facilitate an exceptionally fast and accurate means of inspecting parts, Pratt & Whitney, Division Niles-Bement-Pond Co., West Hartford, Conn. announces a new Electrolimit comparator. By the use of this device, a P&W electric contact unit is combined with the P&W Electrolimit head to produce a unit for accu-



rately detecting product limits. Neon light tubes for undersize and oversize are positioned at the side of the meter, requiring only one line of vision for both the light and the meter.

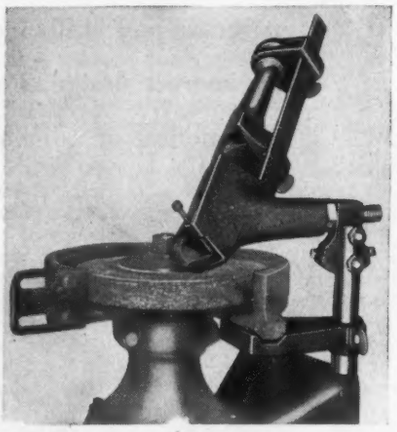
During the inspection, operator knows in an instant whether part is undersize, oversize or within the limits by watching the limit lights. Minus light on the left, being normally on, will remain so when the part is undersize. When the part is oversize, the minus light will be turned off and the plus light on the right will flash on. When part is within the determined limits, both lights will remain off.

Should the operator desire to make an actual size reading of any part being checked, it is only necessary to slow up the high-speed gaging operation sufficiently to take the reading on the indicating meter.

Steel 3/4/46; *Item No.* 9069

Drill Grinding Fixture

Industrial Mfg. Co., 1900 Euclid avenue, Cleveland, introduces an improved Ind-L-Way drill grinding fixture. Available in two models, it handles all sizes



of drills from 1/4 to 2 7/8 in. in diameter and up to 26 in. long.

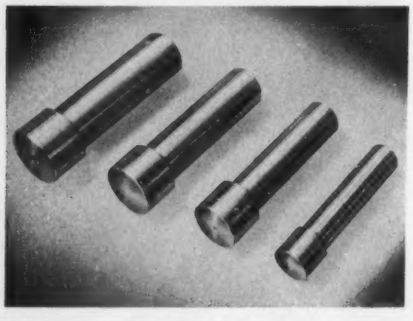
These fixtures are made for use with Black & Decker and Van Dorn bench and pedestal grinders or other makes of grinders having the same dimensions.

Steel 3/4/46; *Item No.* 9062

Rotary Stock Stop

A rotary stock stop of new design, available in four sizes for use on automatic screw machines and turret lathes, is announced by Barnaby Mfg. & Tool Co., Bridgeport 8, Conn.

Compact and sturdy, these devices



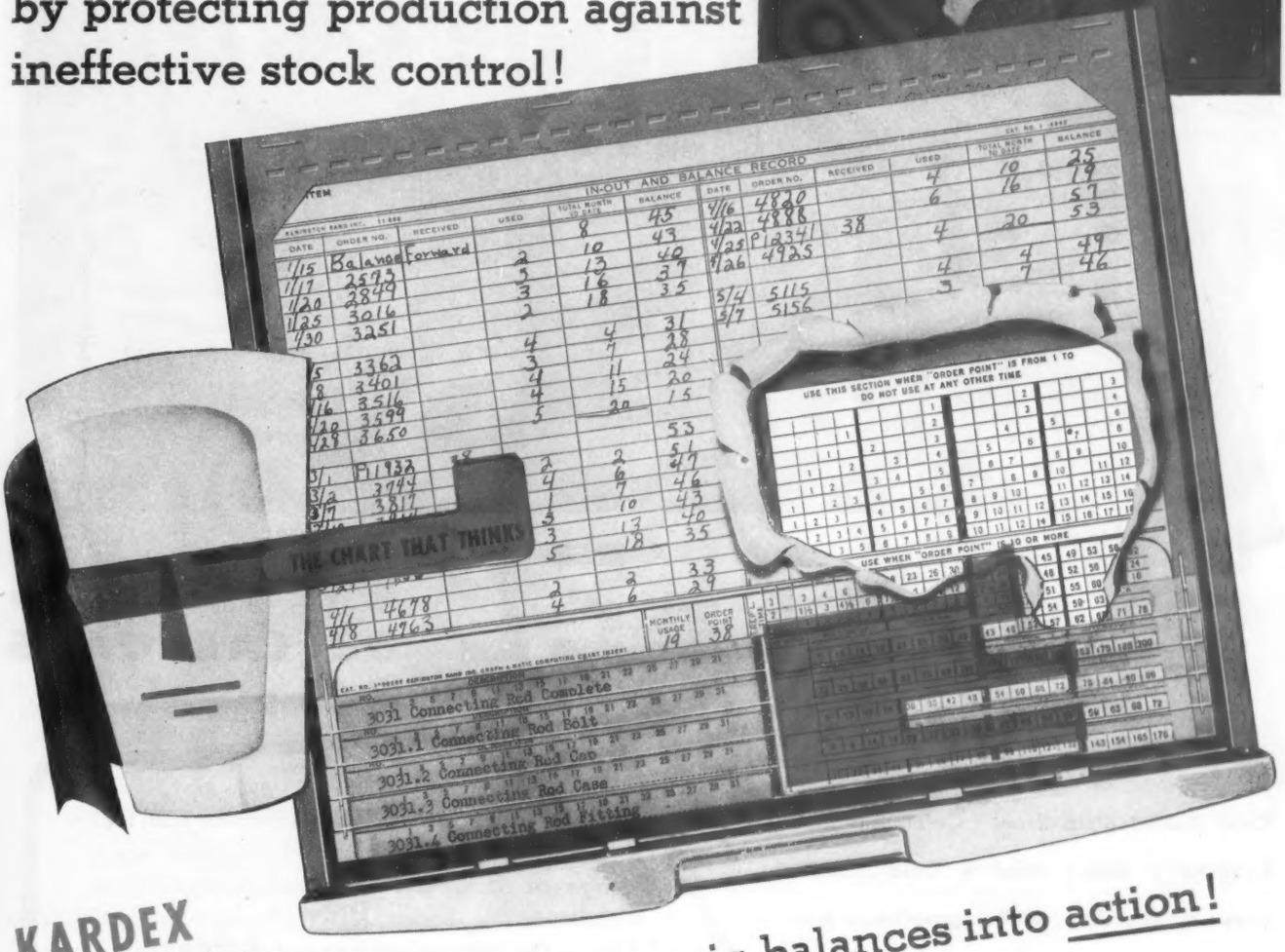
have a live head which rotates freely with the bar stock, eliminating friction between work and stop. Thus there is no marring of the finished stock end during feed; and greater uniformity in length of feed is obtained. In addition, elimination of friction between stock and stop reduces wear in screw machine mechanisms.

These tools have absolutely no back-

(All claims are those of respective manufacturers; for additional information fill in and return the coupon on page 153.)

It takes the DRAG out of output...

by protecting production against ineffective stock control!


IN-OUT AND BALANCE RECORD
THE CHART THAT THINKS
USE THIS SECTION WHEN "ORDER POINT" IS FROM 1 TO
DO NOT USE AT ANY OTHER TIME
USE WHEN "ORDER POINT" IS 10 OR MORE
3031 Connecting Rod Complete
3031.1 Connecting Rod Bolt
3031.2 Connecting Rod Cap
3031.3 Connecting Rod Case
3031.4 Connecting Rod Fitting

KARDEX GRAPH-A-MATIC automatically converts numeric balances into action!

An idea of extraordinary simplicity is now protecting many American industries against the costly dangers of overstocks and understocks.

This revolutionary device . . . The Kardex Graph-A-Matic Computing Chart . . . puts an end to the risk of error and the need of laborious computations in stock control systems, and is actually saving as high as 50% in record-keeping costs!

By automatically converting stock balances into weeks' supply, the record itself instigates required *action* at the proper *time*. *When to reorder each item, when to expedite or follow up, what stocks should be reduced* . . . these vital facts are unmistakably signalled. *There is no possibility of failure to recognize them instantly* because the action points for all items are in uniform alignment on the visible margins of the records.

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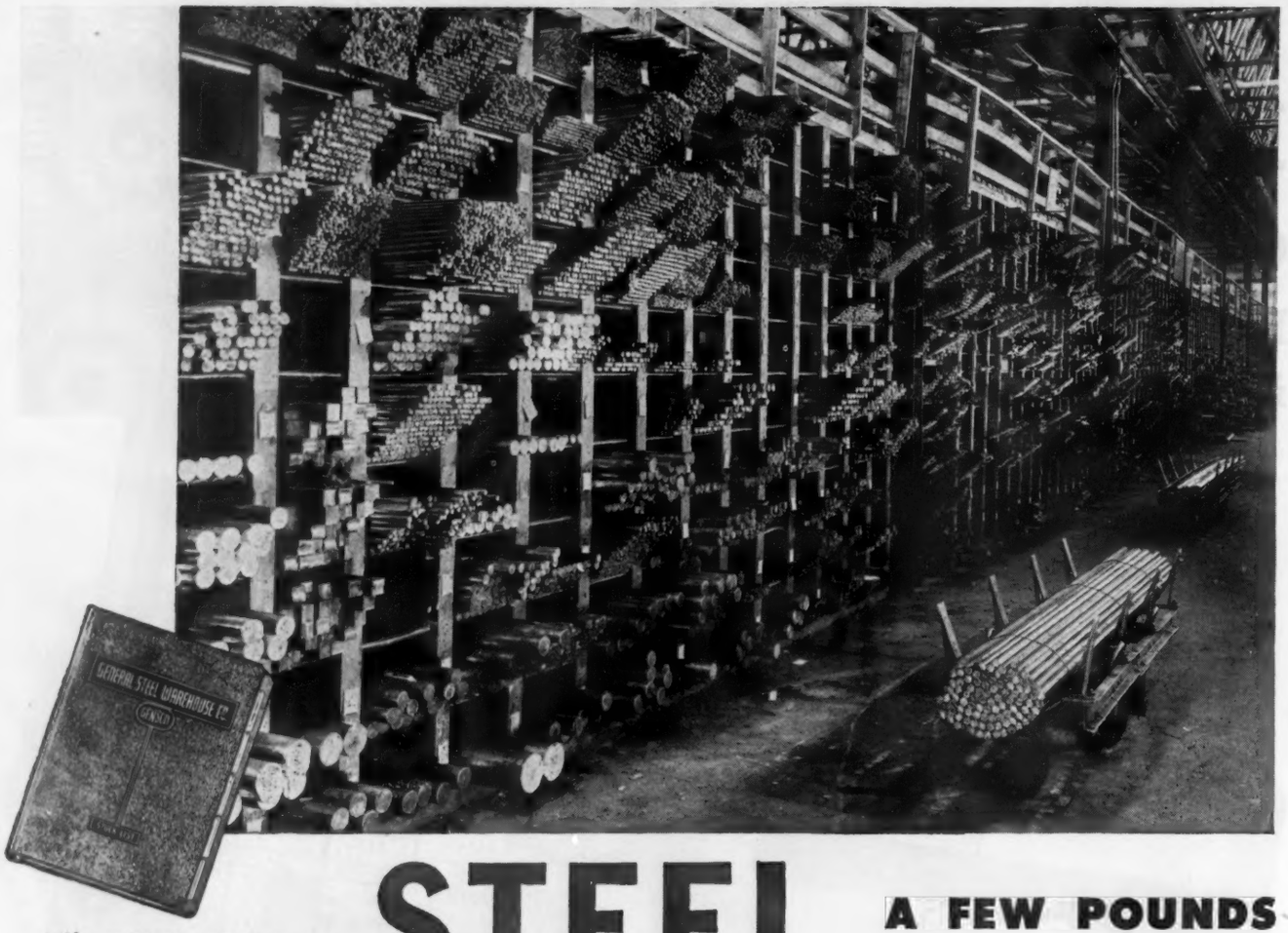

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Cold Rolled Strip Steel—Coils and Straight Lengths • Sheet Steel • Cold Finished Bars • Shafting • Tempered and Annealed Spring Steel • Round Edge Flat Wire • Round Wires • Shim Steel • Aircraft Strip Steel • Feeler Gauge • Drill Rod • Steel Balls.

GENSCO Specialized Steel Service is all that the expression implies—whether you are a large or small user of steel shipped from warehouse.

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Vanderbilt 6-2750	Cherry 0691	Broadway 7629	Wydown 1368	Cherry 4457

lash and are built to withstand hard wear and repeated impact. Regularly furnished with flat end as illustrated, they also can be furnished with rotating member made to accommodate formed or tapered stock ends. Stock stops of the latter design have floating construction to facilitate the required accuracy of alignment.

Steel 3/4/46; *Item No.* 9019

Blind Rivets

To meet the need for larger diameter blind rivets, three new diameters, 7/32, ¼, and 9/32-in. are introduced by Cherry Rivet Co., 231 Winston street, Los Angeles 13. These rivets are avail-

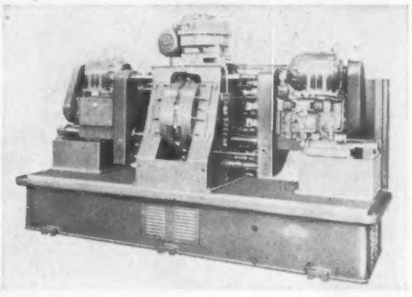
able in the three standard types: Self-plugging, regular hollow and pull-through hollow; in modified brazier and 100° countersunk heads; in A17ST or 56S aluminum alloy, and in steel.

To install these larger rivets, a pneumatic-hydraulic Cherry Rivet gun, the G-40, is being manufactured. It operates on 75 to 90 lb air line pressure, is 13 in. high and weighs 7 lb. The gun is well-balanced for easy one-hand use in any position.

Steel 3/4/46; *Item No.* 9058

Milling Machine

Special-purpose, double-end machine for hollow milling one or two trunnions on converter blades of various shapes and sizes is announced by Snyder Tool & Engineering Co., 3400 East Lafayette, Detroit 7. Two self-contained hydraulic units and multiple heads and an electrically driven fixture trunnion with holding jaws are assembled on a welded



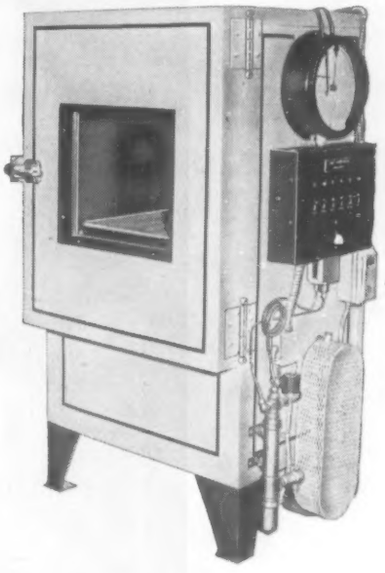
steel base. Coolant tank is in the rear of the base. Tool spindles are guided in trunnion side members and are equipped with precision end stop adjustment to maintain accuracy and depth of cut. Trunnion is indexed station to station by a Geneva index mechanism mounted on top of the trunnion assembly.

Parts are located in jaws by means of two side locating plates. Each fixture has an individual hydraulic cylinder which automatically clamps part while fixture indexes from loading station to first working station. Each index station has three fixtures holding three parts, each of which is identically machined at the same time. Work-cycle consists of an index followed by tool work and is semi-automatic. Operator presses a button after loading three pieces. Unloading is automatic. Work parts of various shapes and sizes are accommodated by exchanging holding jaws on fixture and the adjustment of side locating plates.

Steel 3/4/46; *Item No.* 9932

Temperature Regulator

A self-contained, spring loaded, internal pilot, piston operated temperature regulator for steam service, is introduced by Leslie Co., 152 Delafield avenue, Lyndhurst, N. J. Feature of the new regulator is duo-matic control, whereby temperature regulation and



pressure control are obtained simultaneously with a single regulator, thus simplifying piping and reducing installation costs.

Regulator has a wide range, rugged thermostatic element with 100° F adjustable temperature range, is single-

FOR MORE INFORMATION on the new products and equipment mentioned in this section, fill in this form and return to us. It will receive prompt attention.

Circle numbers below corresponding to those of items in which you are interested:

9054	9058	9023
9069	9932	9041
9062	9984	9029
9019		

3-4-46

NAME ..... TITLE .....

COMPANY .....

PRODUCTS MADE .....

STREET .....

CITY and ZONE ..... STATE .....

Mail to: STEEL, Engineering Dept.—1213 West Third St., Cleveland 13, Ohio

(All claims are those of respective manufacturers; for additional information fill in and return the coupon on this page.)

ON YOUR POSTWAR TOES!

There's a war-torn world to be rebuilt and refurnished . . . a vast potential market for those on their postwar toes. And G-E X-Ray is a working partner to help your industry into that category.

X-ray pre-proves product quality, rapidly and non-destructively . . . Conclusively, too, because flaws have no privacy when castings or welds are inspected by x-ray. It's prestige protection.

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Whatever your product or problem, there's a G-E X-Ray Industrial Unit for you. It will pay you to get in touch with us—today. Write or wire to General Electric X-Ray Corporation, 175 Jackson Blvd., Chicago 4, Illinois, Dept. 2516.

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GENERAL ELECTRIC X-RAY CORPORATION

seated for positive dead-end control, and is equipped with metal diaphragms. It has no bellows or packing glands. All wearing parts are renewable, interchangeability allows overhaul without removal from the pipe line. Corrosion and wear resistance is obtained with the use of stainless steel hardened wearing parts. Vital parts are hardened to at least 500 brinell.

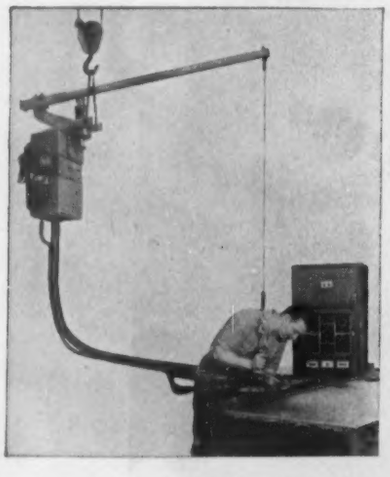
A temperature drop of 1° F at bulb reduces vapor pressure, allowing limit spring to open controlling valve and deliver an increased steam pressure to heat exchanger. Outlet steam pressure is always directly proportional to the change in temperature at bulb and this pressure is automatically maintained regardless of the volume of steam used by heater or variations in supply pressure.

Steel 3/4/46; *Item No.* 9984

Spot Welding Units

A new line of overhead type portable spot welding units is announced by Sciaky Bros., 4915 West 67th street, Chicago. Both pneumatic and hydraulic systems are available with transformer ratings of 50, 75 and 100 kva.

A variety of standard gun styles in both alligator and C types are designed



to fit nearly every application. Special emphasis is laid on lightness in both gun and cable design, permitting the operator to work faster with less fatigue. Spring type or pneumatic balancers are provided for easy positioning of the gun.

Transformers may be with or without tap switch. Electronic control units are available for control of welding sequence, current interruption and, where desired, electronic control of welding heat. Unit may be permanently suspended for production lines, or hung from any jib hoist, monorail, etc., for tack or structural welding on large assemblies.

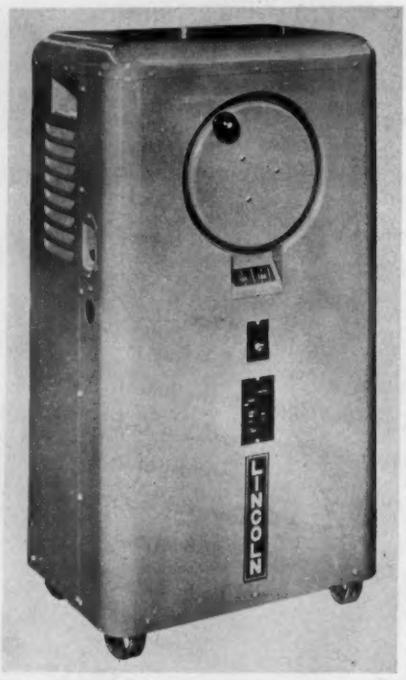
Hydraulic system makes efficient use of water with special fast-acting booster and electro-valve. In case of leakage, system is automatically refilled from same line supplying cooling water to transformer, cables and gun.

Steel 3/4/46; *Item No.* 9023

Welder for Farm Use

A new welder which is ideal for rural power lines is announced by Lincoln Electric Co., Cleveland 1.

Designated as the Fleet-Arc Jr., this unit is for 230 v single phase power lines and meets the limited input re-



quirements of rural utilities and REA by a design of high efficiency and high power factor. It has a maximum input current of 35 amp and provides a machine which meets the new NEMA standards for this type of welder. It can be used with the standard 3-kva power transformer provided by the power company. Current range is from 20 amp at 20 v to 180 amp at 25 v welding duty. This gives sufficient capacity for all types of jobs found on most farms or job welding shops. It will handle electrodes ranging from $\frac{1}{16}$ to $\frac{5}{32}$-in. diameter.

It inaugurates a new development known as the Arc Booster which provides quick, easy arc starting. The instant the electrode touches the work, welding current is given a boost of intensity for starting the arc. Current then reverts automatically to amount set for the job. No high voltages or special high frequency devices are used, output voltage being limited to a maximum of 52 v.

Either of the two degrees of arc boosting provided is selected by a snap switch, one for general work and the other lower amount for thin material such as automobile fenders.

Current control for the welder is of the separate adjustable reactance type which is varied by turning a hand wheel. Adjustment is continuous over entire welder range of from 20 to 180 amp.

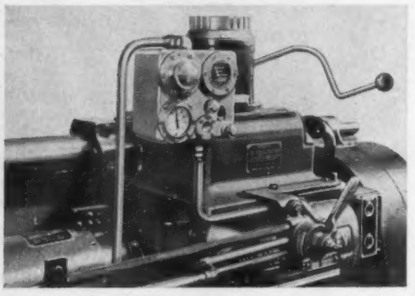
Design and construction features of the new welder include: Wear-free and vibrationless reactor current control with self-cleaning chain drive. No taps or plugs to develop loose connections.

Heavy copper winding with spun glass insulation and mica coil separators. Arc welded steel frame and housing.

Steel 3/4/46; *Item No.* 9041

Air Regulator

For unfailing capacity performance and increased service life of machines, tools and other equipment operated by compressed air the new R-F-L unit is offered by Logansport Machine Co. Inc.,



Logansport, Ind. In a compact casting measuring 6 in. square by 4¾ in. deep, the unit incorporates all components of the awkward assembly of reducing valve, pressure gage, filter and lubricating device. All connections are built into the casting, thus eliminating piping and the resultant pipe friction. All components are controlled from or visible on the front panel. It is mounted in the air intake line from the main air line, and is adapted to location on a central control panel. In operation, the unit levels out surges and sudden drops in the air supply, and keeps working pressure uniform with minimum air consumption. Filter and lubricator assist any air equipment to operate at peak capacity, and effect a marked increase in service life. The unit performs three functions: 1. Regulates air pressure, thus providing smooth, full uniform actuation; 2. filters air to separate rust, scale, other foreign matter and water, thus assuring unfailing operation and reducing wear; 3. lubricates working parts of air equipment by automatically injecting a continuous oil mist into the air supply. This minimizes wear and protects cylinders, valves, tools, etc., against rust and corrosion.

Steel 3/4/46; *Item No.* 9029

(All claims are those of respective manufacturers; for additional information fill in and return the coupon on page 153.)

racolloy electrodes

ANSWER THE STAINLESS STEEL ROLLCALL

REID AVERY GRADE	AISI TYPE	MATERIAL TO BE WELDED
RACOLLOY 18-8	308	Unstabilized 18-8 Stainless Steel.
RACOLLOY 18-8 CB	347	Stabilized 18-8 Stainless Steel.
RACOLLOY 18-12 (2-3% Mo)	316	Type 316 Stainless Steel.
RACOLLOY 25-12	309	Type 309 heat resisting Steel and stainless clad.
RACOLLOY 25-12 CB	309+CB	Type 309 heat resisting Steel.
RACOLLOY 25-20	310	Type 310 heat resisting Steel & air-hardening Steels.
RACOLLOY 19-9	307	Air-hardening Steels.
RACOLLOY 18-8 (1.5% Mo)	None	Air-hardening Steels.

It makes no difference whether stainless steel welding plays a large or small part in your manufacturing process, RACOLLOY Electrodes will net you a profit . . . you can depend on them for excellent results.

RACOLLOY stainless steel electrodes are supplied with three types of coatings: titania type and lime type for direct current, reverse polarity and AC-DC type for alternating current and direct current. The AC-DC type can be used on all types of welding transformers.

We will be glad to send you samples.

The REID-AVERY COMPANY
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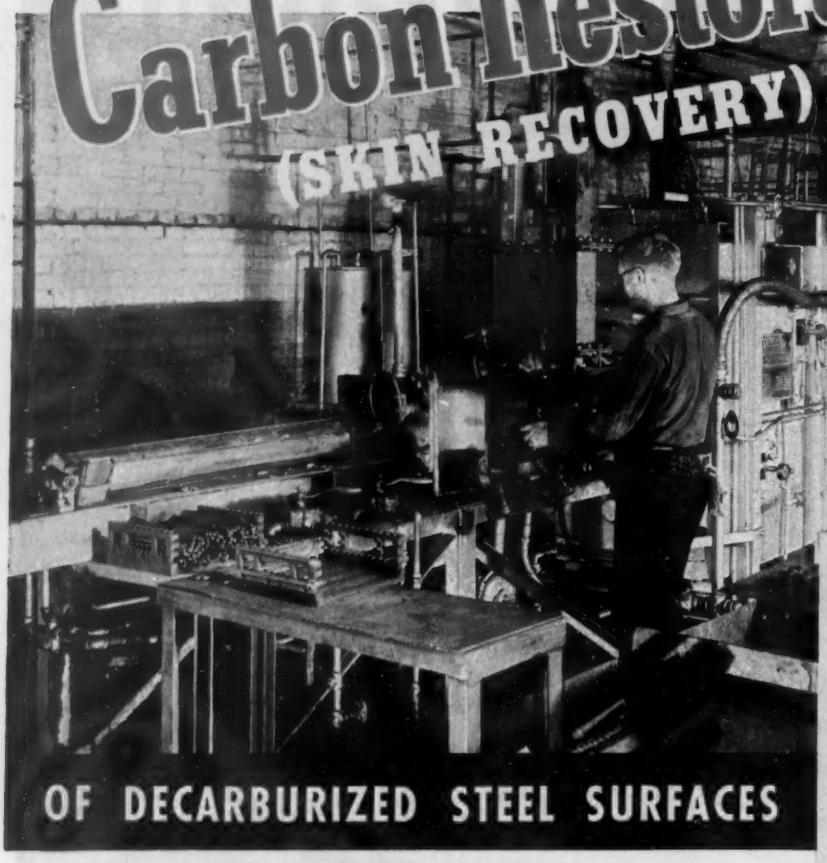
SINCE 1919 PRODUCERS OF ARC WELDING ELECTRODES AND WELDING RODS

Carbon Restoration (SKIN RECOVERY)



OF DECARBURIZED STEEL SURFACES

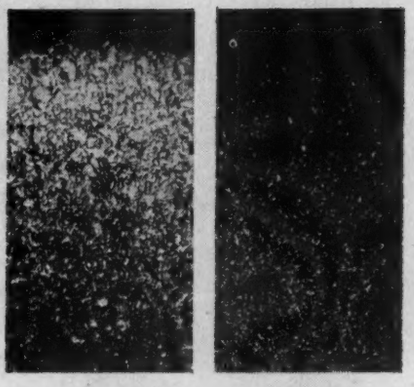
'SURFACE' ACHIEVEMENTS IN THE SCIENCE OF GAS CHEMISTRY AND HEAT TREATING

*

Photo above shows 'Surface' continuous, pusher-type furnace used for carbon "skin recovery" treatment.

● Carbon Restoration or "Skin Recovery" is a simple controlled-atmosphere process based on the principle of carbon pressure balance...applied today to various engineering steels.

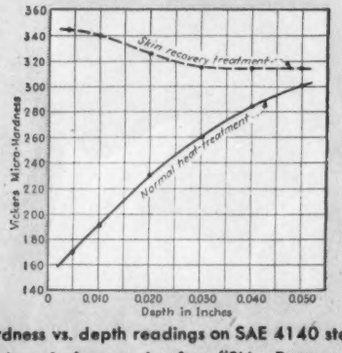
This process is another 'Surface' development to come from extensive research in the Science of Gas Chemistry. Write for reprint "Skin Recovery for Decarburized Steel Surfaces" for further details of the process and application.



ONE EXAMPLE

Left: An SAE 4140 forging showing decarburized edge after normal heat treatment.

Right: Same SAE 4140 forging after "Skin Recovery" treatment.



Hardness vs. depth readings on SAE 4140 steel forgings before and after "Skin Recovery".

'Surface'

*** SPECIAL ATMOSPHERE, RADIANT-TUBE FURNACES FOR:** Gas Carburizing and Carbon Restoration (Skin Recovery), Clean and Bright Atmosphere Hardening, Bright Gas-Normalizing and Annealing, Dry (Gas) Cyaniding, Bright Super-Fast Gas Quenching, Atmosphere Malleableizing, Atmosphere Forging, and Specific Effects upon Metal Surfaces.

SURFACE COMBUSTION CORPORATION · TOLEDO 1, OHIO

Welding Electrode Types

(*Continued from Page* 123)

of the base metal that is being joined.

Much sheet metal work is completed in the vertical position. E6013A electrodes are applied by running from the top to the bottom of a vertical joint. Again the arc should be held as short as possible. Travel speed should be rapid. In sheet metal joining the exception to one fundamental and well established rule of welding will be found; i. e., welding in the flat position is not faster than welding in a vertical or downhill position. With all the emphasis that has been placed on flat position welding this variation from general practice will bring about a marked reduction in welding costs.

Although overhead welding may be done on sheet metal with E6013A electrodes, it should be avoided wherever possible. If overhead welding must be done, keep the current high as with other welding positions and oscillate or whip the electrode to produce a bead with the least convexity.

Three examples of light gage welding (a ¼-in. tee weld is included although strictly speaking this is not a light gage metal) will be given. Fig. 4 depicts a 14 gage tee weld welded from the top to the bottom. Using alternating current the E6013A electrode was preferred by the welder under the welding conditions reported below:

5/32 x 14-in. electrode	E6013A	E6013U
Low current	100A 15V	85A 19V
High current	210A 25V	205A 25V

In all data A indicates amperes and V indicates volts.

Fig. 3 shows a ¼-in. tee weld from the bottom to the top because the design required a heavier fillet than could be made in a single pass welding from the top down. Here again the welder preferred the E6013A electrode because he had less slag to control. Alternating current welding conditions are reported below:

5/32 x 14-in. electrode	E6013A	E6013U
Best current	155A 19V	155A 22V

In this application the welder was permitted to select what he considered to be the best current for each electrode. Notice that the current was the same but the voltage was higher for the E6013U electrode. The latter is a hotter electrode with a more fluid deposit and a heavier coating of slag which partly explains the higher voltage.

An 18 gage corner weld like that shown in Fig. 2 was made by the same welder using a 3/32-in. electrode. In this application a preference was shown for the E6013U electrode because the welder was able to make a smaller, smoother bead at a higher speed. De-

Standard Euclid Cranes are available in sizes, types and spans to meet well over 90% of all material handling requirements.

Having been developed through several decades of specialized experience they embody design and construction that assures maximum service life with minimum operation and upkeep expense.

Standardized manufacturing assures interchangeability of parts and effects economies that assure the utmost value to purchasers.

Standard Euclid Cranes are available in capacities of 3, 5, 7½, 10, 15, 20 and 25 tons in various spans consistent with their size and power.

It may be definitely to your interest to install a Euclid *standard* crane. Write for catalog.

THE EUCLID CRANE & HOIST CO.
1365 CHARDON RD. • EUCLID, OHIO

then he said to himself:

"Beat their brains IN . . . not out"

AGED Japanese Diet member, YUKIO OZAKI, lifelong champion of parliamentary government, recently called upon his colleagues to resign rather than persist in blind obedience to government. Said he:

> "Our people of today do not know right from wrong. We must pour into their heads the law of humanity and the difference between right and wrong."

The difference between the right way of doing things and the wrong way would seem an easy thing to knock into heads,

—but even here in America it sometimes takes KNOCKS like that of the SHERIFF to awaken interest;

—while with others the gentle KNOCK of OPPORTUNITY spurs them to deeds for the good of all.

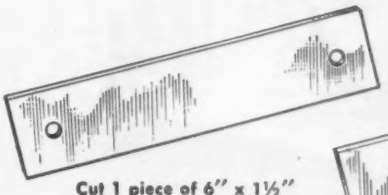
The difference between RIGHT and WRONG . . . *he says*

LOOK, OZAKI . . . Here is the difference between RIGHT and WRONG in manufacturing a bracket such as shown:

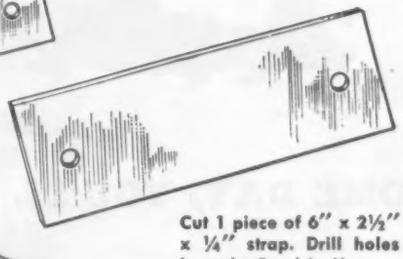
WRONG:

Cost 13¢ each
of conventional construction.

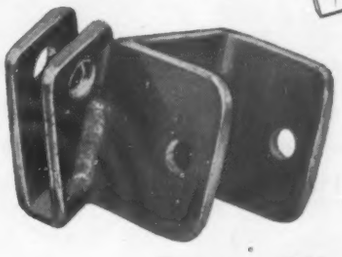
RIGHT:



Cut 1 piece of 6" x 1½" x ¼" strap. Drill holes in ends. Bend in U.



Cut 1 piece of 6" x 2½" x ¼" strap. Drill holes in ends. Bend in U.



Fit up in jig and weld on both sides.

Cost 8¢ each
of welded steel.

DIFFERENCE: Saved 5¢ Each

This bracket, 10 of which are used on each harrow, is typical of many parts changed over to welded design by an implement manufacturer. Perhaps your product has similar parts. The Lincoln Engineer will gladly help you study the possibilities of welded design as applied to your problems.

STUDIES IN MACHINE DESIGN . . . issued periodically. Free on request. Ask for them on your business letterhead.

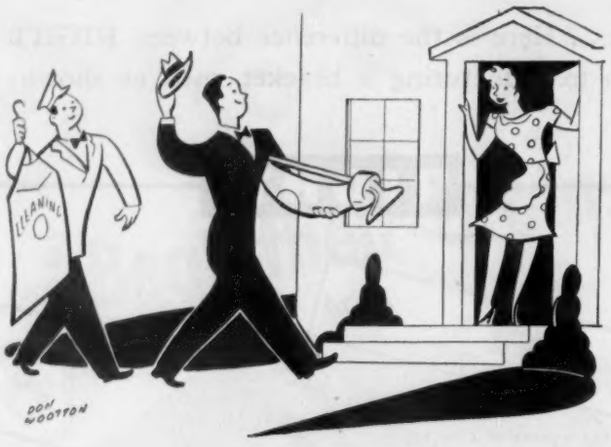
THE LINCOLN ELECTRIC COMPANY
DEPT. L-1 • • CLEVELAND 1, OHIO

The RIGHT Ways to Control Distortion

The new Lincoln sound-color movie, "The Prevention and Control of Distortion in Arc Welding", by Walt Disney Productions, explains simply and clearly the causes and cures of distortion. A valuable aid to designers and production men. Available free for showing to groups. Ask for Bul. 709.

America's greatest natural **recourse**

ARC WELDING



SOME DAY, YOU'LL SELL OR BUST!

No business transaction is completed until goods or services are sold for a little more than they cost to deliver.

Today, selling is not much of a problem. Goods are in short supply. People have money. They are disposed to buy. They don't have to be sold.

But tomorrow may bring a different picture.

Think of this. American industry's ability to produce is greater than ever before. It may not be long before we'll be able to turn out an oversupply of everything.

Then who will get the business? Who will prosper?

The answer is: With quality, design and price all tending toward equality, salesmanship and service will be the key to sustained volume.

Wise management is taking advantage of this period of easy sales to prepare selling and service machinery for the days when it will have to be better than production machinery in efficiency—and in results.

Geo. D. Trundle Jr.
President

This organization of over a hundred trained engineers has twenty-seven years of consulting management engineering experience. We invite you to write for more information, or to request a personal interview in your office.

THE TRUNDLE ENGINEERING COMPANY

Cleveland, Ohio, Bulkley Building

CHICAGO, City National Bank Building, 208 S. LaSalle Street

NEW YORK, Graybar Building, 420 Lexington Avenue

tails are given in the data shown below:

3/32 x 14-in. electrode	E6013A	E6013U
Low current	50A 20V	55A 20V
High current	60A 28V	85A 27V

These welds were made with alternating current and the surprising thing is the lower voltage at the high current with the E6013U electrode. This indicates a shorter arc possibly because the higher current enabled the welder to ride his electrode in the corner.

In the heavier sections there is no argument about the selection of the E6013U electrode. Two examples are given. The first of these illustrated in Fig. 1 was accomplished with alternating current using a ¼-in. electrode under the following conditions:

1/4 x 18-in. electrode	E6013A	E6013U
Best current	285A 24V	330A 25V

The E6013U electrode was preferred on two counts: One, a smoother, flatter bead; and, two, a faster production rate because of the higher current.

An identical set-up to that in Fig. 1 was selected with ¼-in. material where again the E6013U electrode was chosen by the welder using alternating current as follows:

1/4 x 18-in. electrode	E6013A	E6013U
Best current	285A 23V	310A 24V

E6013U electrodes produced less spatter and gave a smoother performance than the E6013A type in addition to the two reasons given in connection with Fig. 1.

These examples have been used to illustrate certain points in revealing the differences between E6013A and E6013U electrodes. Similar joints could be welded with E6012 or E6020 electrodes and in some cases an advantage might be gained. Specific shop conditions and equipment along with the skill of the welders all play a part in arriving at the ideal solution for welding a particular joint with the best electrode type.

Accompanying table presents a comprehensive picture of the properties of the two E6013 electrodes. Each of the points of difference will be discussed in detail.

The 3/16 x 14-in. size is reported because this is the largest diameter that is regularly employed in vertical and overhead welding. The physical properties and x-ray quality in the smaller diameters are always better. Both electrodes will give perfect x-rays when stringer beads are used to maintain a small molten pool allowing enough time for the gas to escape. But production work is seldom executed under such ideal conditions.

The current values for these tests are higher than those found in welds made with E6010 or E6011 electrodes. In general the E6013U electrode will carry more current than the E6013A. Ex-

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cessive currents will detract from the ductility of the deposited weld metal. Here, again, the voltage results are higher with the E6013U type because of heavier coating and because of the chemicals found in the coating.

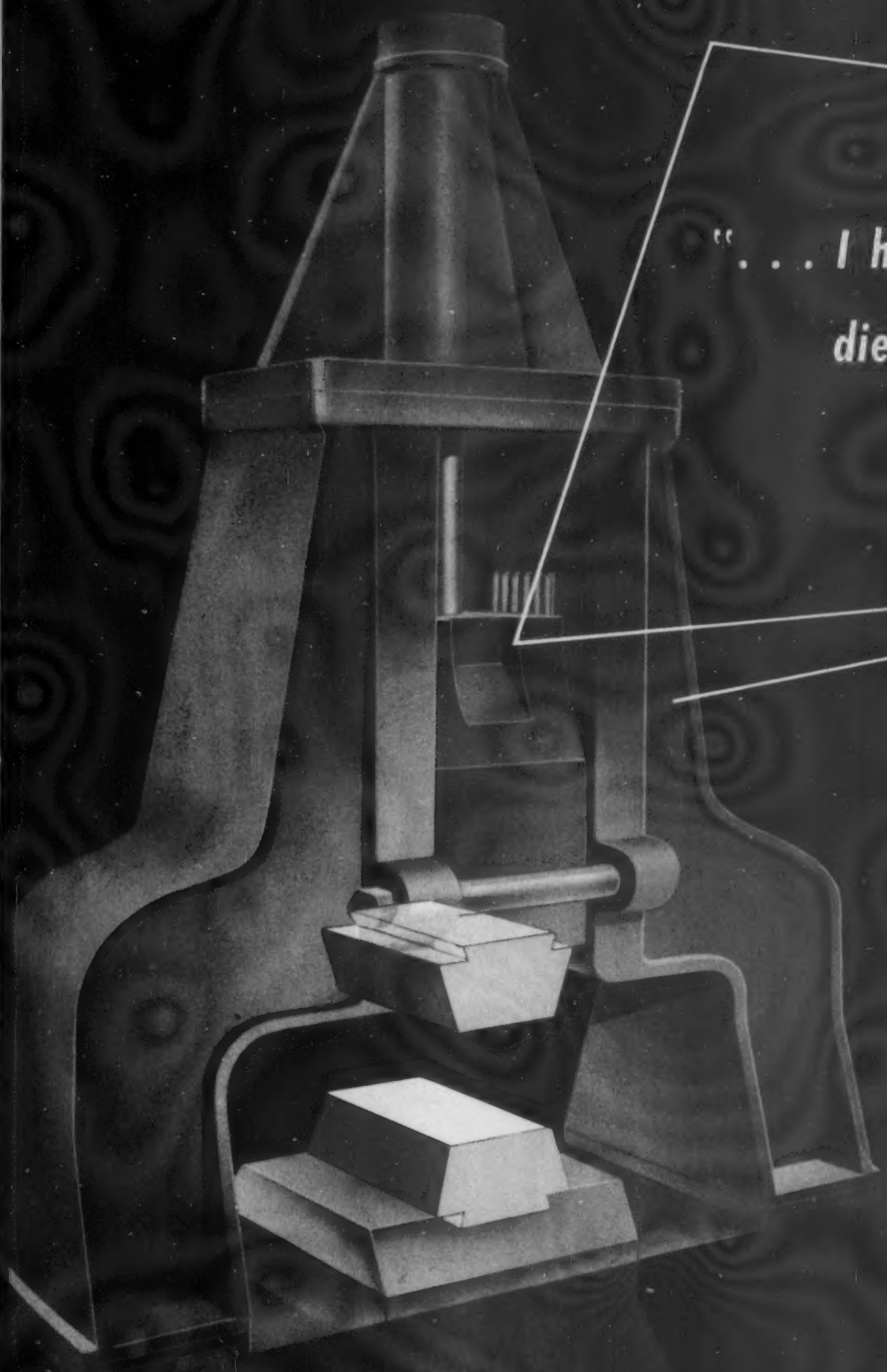
The deposition rates at the same current appear to favor the E6013A type although this difference does not always exist. E6013A electrodes exhibit a higher deposition efficiency brought about by the lighter coating. Spatter loss is less with the E6013A electrodes according to this test while other data indicates a reversal of position. Core wire variations found in all electrodes will change these values. Burn-off rate favors the E6013A, also. A summary of deposition characteristics indicates a superiority for the E6013A type when the same current is employed. When higher currents are carried by the E6013U electrode, deposit rates outstrip the E6013A.

Physical Properties

Now that the matter of physical properties is at hand, an explanation of the confusion over the correct classification of E6013U electrodes becomes more apparent. Both the as welded and the stress relieved results satisfy the minimum values established by the controlling specification, AWS-ASTM A233-45T. And the excellent quality leaves absolutely nothing to be desired. But the arc action is different.

Very satisfactory welding results may be attained with direct current, reverse polarity. Physical properties are correct. Therefore, argue some, E6013U electrodes are really E6010 electrodes. Hold on, state others, these are alternating current electrodes with E6011 mechanical properties and must be grouped in E6011. In the last analysis the physical property values are only part of the classification scheme. When the soft arc action and less deep penetration are brought into the data, E6013 appears to be the most logical solution.

As far as is known there is no plot to prevent the use of the good properties of E6013U electrodes wherever they are suitable. The outstanding, yes outstanding, cleanliness of E6013U weld metal is bound to suggest vertical and overhead welding in structures where E6010 electrodes have been the choice for years. As a matter of record some E6013U electrodes will consistantly yield better x-rays than some E6010 types. Ductility values are comparable, too. And there is no comparison in welder appeal. This last statement can be proved in any shop by giving the welder his choice between E6013U and E6010 electrodes, regardless of make. Less operator fatigue with the E6013U type means more man hours of productive



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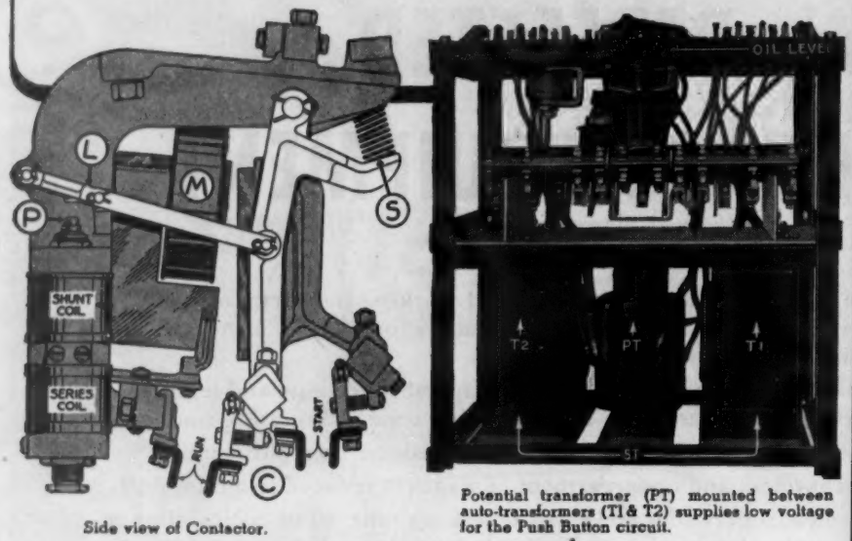

Side view of Contactor.

Potential transformer (PT) mounted between auto-transformers (T1 & T2) supplies low voltage for the Push Button circuit.

THIS EC&M automatic Motor Starter for reduced voltage starting of 2300 volt squirrel-cage or synchronous motors uses a simple double-throw contactor (C). The interlock (L), between the starting and running contacts, is inherent in the basic design.

The single operating magnet (M), when energized by the push button, closes the starting contacts, connecting the motor to reduced voltage. When the motor accelerates to the proper speed, a current limit relay raises plunger (P) to trip the mechanical interlock (L). The running contacts then close, connecting the motor across the line. During transition, continuous torque is applied to the motor.

There is no other starter built like this EC&M automatic. Magnetic overload relays of the non-creeping, drop-back type are enclosed above the conduit connection box. Door permitting access to them is arranged for padlock. Meters are optional. Investigate these 2300 volt starters. Bulletin 1047-C, describing them, will be sent promptly on request.

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welding. Furthermore the reduced tendency to undercut enables the welder to make a larger fillet or thicker deposit per pass thereby reducing cleaning costs. E6010 electrodes produce a friable slag that is easy to remove. E6013U electrodes also possess a friable slag that is easier to remove. In some positions the slag curls away from the weld itself.

A case has been presented for the selection of 3/16-in. and smaller diameters of E6013U electrodes in high quality services. First passes where penetration into the corners or along the edges of a backing strip is necessary will demand more care than E6010 electrodes require. But outside of this one possible difficulty the E6013U electrode will hang up a commendable record. In fact some users are using a combination: E6010 in the root and E6013U for the following passes.

Summarizing the two E6013 electrodes there seems to be a general field preference for E6013A in sheet metal fabrication and for E6013U in heavier work. Exceptions have been noted but the major division is based on metal thickness. Both electrodes have a high level of arc stability with the E6013A holding an edge in the deposition department (at the same current) while the E6013U wins out in the physical property and soundness department.

Report Gives Details on Sponge Iron Manufacture

Another in a series of publications describing the successful commercial-scale production of good quality sponge iron in the United States has been issued by the Bureau of Mines, demonstrating that periodic brick kilns can be used advantageously without alteration.

Based on a recent Bureau sponge iron project at the Stark Brick Co., Canton, O., the publication reports that 468 tons of sponge iron comparable in quality to that made in the famous Swedish kilns were produced. With the exception of 42 tons retained for further Bureau testing, the entire output was consigned to various steel companies and wrought iron companies.

Included in the Bureau report are details on the construction, charging, and firing of containers, types of ore reduced, a description of reducing agents, and pertinent cost data for commercial production of sponge iron in periodic kilns.

A copy of the publication, Report of Investigations 3841, "Manufacture of Sponge Iron in Periodic Brick Kilns," by K. M. Smith and S. E. Burton, may be obtained free by writing to the Bureau of Mines, Department of the Interior, Washington 25, D. C.

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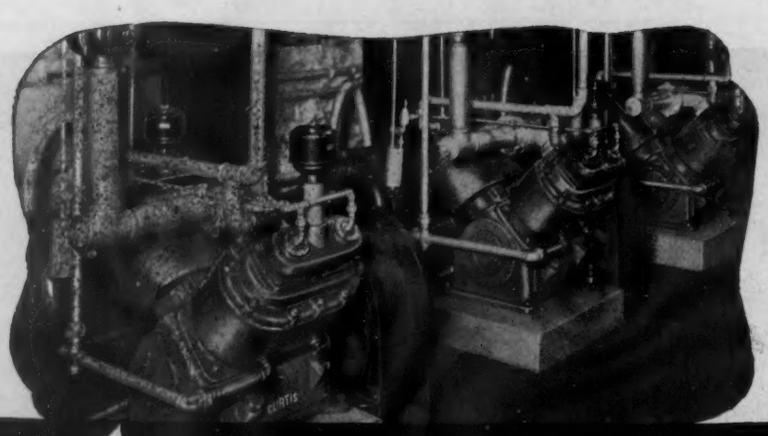

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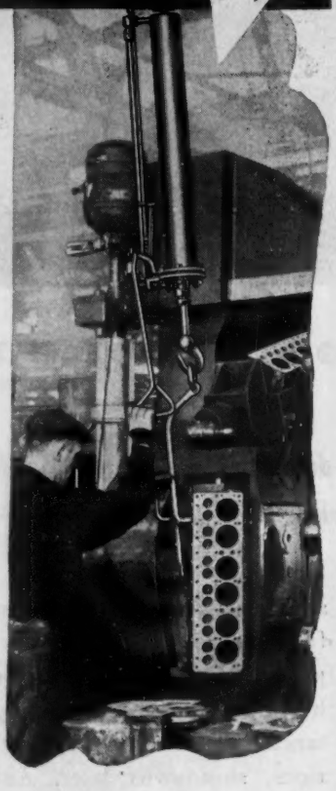

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Cold-Die Quenching

(*Continued from Page* 129)

120° F, from a hardening temperature of approximately 1600° F, about twice as fast when gripped between a pair of dry cold dies as it will if quenched in oil. In fact, it is safe to say that any heat treater handling any variety of work at all should have a good pair of flat, water-cooled dies on hand just to handle the odd blades, thin gages, disks, washers, cutters, etc., which are inevitably going to need hardening.

It might at first glance appear likely that the hardening die would have to have a complicated water channelling very close to the working face of the die in order to obtain maximum cooling effect, (and possibly there are applications where this would be desirable), but in our wide application of this technique to many different parts we have never found this necessary. The dies we use rarely have more than a few quarter-inch holes drilled parallel to the working face and a fourth to a half inch away from it. The water channels serve only to return the entire block to a cold condition after a piece is quenched and before the next part is charged into the die. Virtually all of the heat from the part is absorbed by the far larger mass of the quenching die and the water channels are not relied upon for any immediate cooling of the part.

"Waffle Iron" Die Advantageous

Dies will usually harden three or four pieces without any water in them before their temperature rises enough for them to become ineffective. The water channels have only to be sufficiently numerous and well distributed to insure that, at the time of charging the next piece into the die, the block itself is at room temperature or colder. A more usual practice in most shops, for handling thin flat parts, is to use a "waffle iron" type of die with the die face heavily cut away. The part is then flushed strongly with oil through all the grooves and through jets drilled into the die. On parts thin enough to harden with dry cold dies, far better results can be obtained than with the flush quenching type of die or with similar dies actually immersed in oil. "Cold dies" have the additional advantage of being cleaner to use and require far simpler and cheaper equipment. The flushing type of die requires large oil circulating capacity, frequently at sizeable pressures, a suitable press for closing the dies and provision for catching the quench oil and returning it to the pump system and, frequently, a heat exchanger for cooling the oil.

When using "cold dies", all of this is replaced by a very light press and the dies themselves, which only need a quar-

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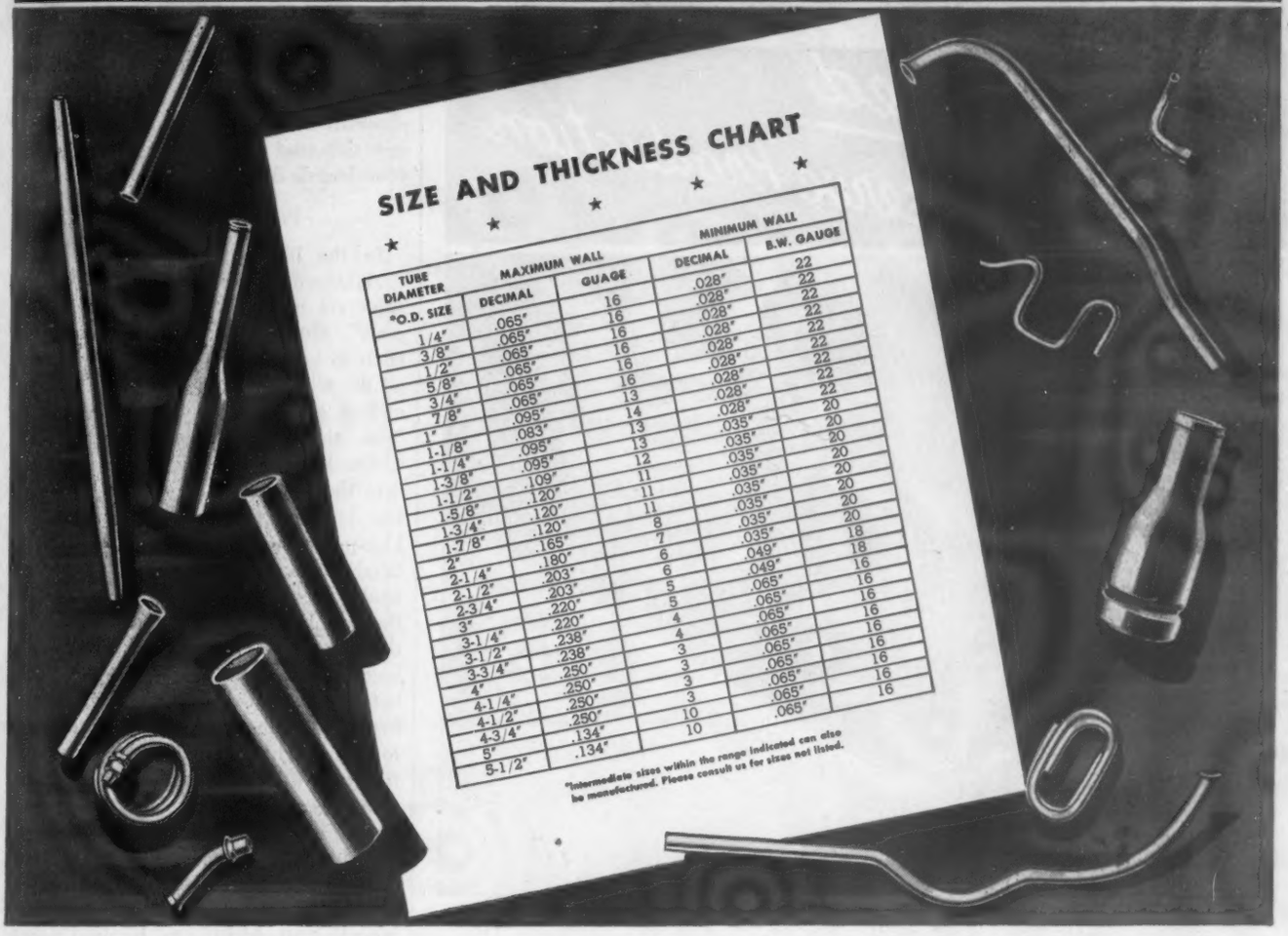

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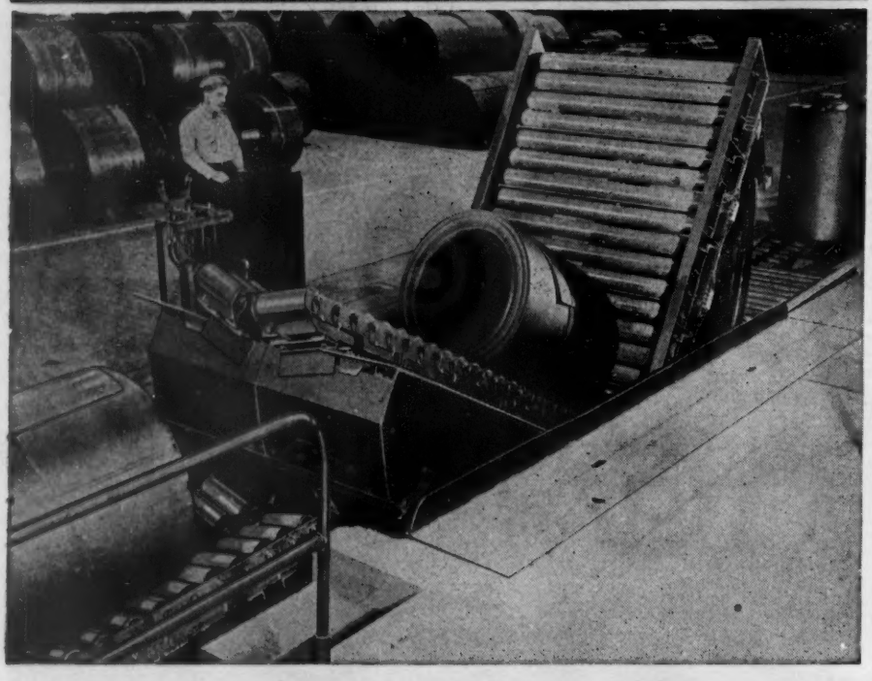

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ter inch hose connection to the nearest water line, and a drain.

Naturally, the process has some definite limitations as to the size and shape of the work it can handle. Generally speaking, thin parts are best adapted to this process. However, as hardenability of the steel being treated increases, considerable thicknesses can be quenched out fully for a given amount of surface in contact with the die. The flatter the part the simpler it is to build the die, although quite complex parts can be handled in special dies where there is a sufficient quantity to warrant cost of such dies. Where much hand straightening is eliminated and scrap is avoided, only a few thousand pieces may easily justify considerable die cost.

Pressure Not High

In the light sections quenched and straightened in these dies, required pressures are not high. An ordinary "kick-press", modified by the addition of a latch to hold it closed, handles virtually all flat work. This has flattened sections of high chrome—high carbon steel up to ¾-in. thick, and of considerable area. Conventional press analysis would indicate that much more pressure than the few hundred pounds delivered by this kick-press would be necessary to actually bend the sections. They are flattened so readily because thermal contractions in the part being hardened are assisting in the straightening. Fig. 1 indicates how a high spot, in contact with the die, cools before the adjacent low spot and shrinks first so that the natural shrinkage tends to make high spots out of low ones and the piece thus helps to flatten itself. Consequently, even for fairly heavy sections the press doesn't have to be much more than strong enough to insure good firm contact for heat transfer and can be a mere puny infant compared to the press that would have to be used if one were going to strike or coin flat the same part.

For more complicated shapes, a self-contained hydraulic vise has been found to be about the best type of "press". The units are inexpensive, costing around $100, and can be mounted in practically any position so that the die is so aligned that the work may be charged into it in the same position it is charged into the furnace. For the "hairpin"-like gunstock, hung in a small vertical furnace for heating, the press is mounted horizontally in such a manner that the die channels for the legs are vertical and the part is charged out of the furnace and into the die without having to be turned over (see Fig. 2). Pressure is generated by a small foot pump and, with the small die openings commonly used, one or two strokes of the pedal are sufficient to apply several tons of pressure to the part.

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This is not particularly strenuous, women operators handle these jobs on heavy production runs, Fig. 3.

This quenching process has been successfully applied to practically all types of steels. Thickness of material which will harden fully with this type of quench naturally varies widely with the hardenability of the steel being used, but in thin sections even a plain carbon steel will quench out to 65 rockwell C. As a rough guide to the practical sections for three widely different types of steel, the chart in Fig. 4 shows the hardness obtained on different thicknesses of plain carbon, manganese oil hardening and high chrome—high carbon types of steel. In addition to the upper limit of size that this chart indicates there is a lower limit of size below which it is impractical to use this quench. When a part is so thin and light that it quenches from lying on the lower die before there is time to close the upper dies and supply pressure, then the parts will warp much worse than if they were oil quenched. On some parts where the sections are too heavy to harden fully from the quenching action of the die itself and only small areas are required fully hard, it is often possible to arrange small quenching jets to chill these areas, or to arrange the dies so that ends required hard can be immersed while still using the die to straighten the balance of the part.

Applied to Case-Hardened Parts

Quenching with water-cooled dies has been very successfully applied to case hardened parts and in fact, the large bulk of current production is case hardened. All these parts, of necessity, have thin cases and are generally held to a "file-hard" specification. We know of no practical method of applying thin cases, in the range of 0.003-0.010-in., wherein our specifications usually lie. Pack carburizing and quenching from a salt bath by this method would obviously be impractical as the frozen salt would defeat the quenching surfaces of the die entirely. For these reasons gas carburizing has been relied upon commonly using an atmosphere with about 65 per cent carburizing gas and the balance ammonia. Casing is generally done in the lower carburizing temperature ranges from 1450° to 1600°F with the actual choice of temperature depending primarily on the case depth.

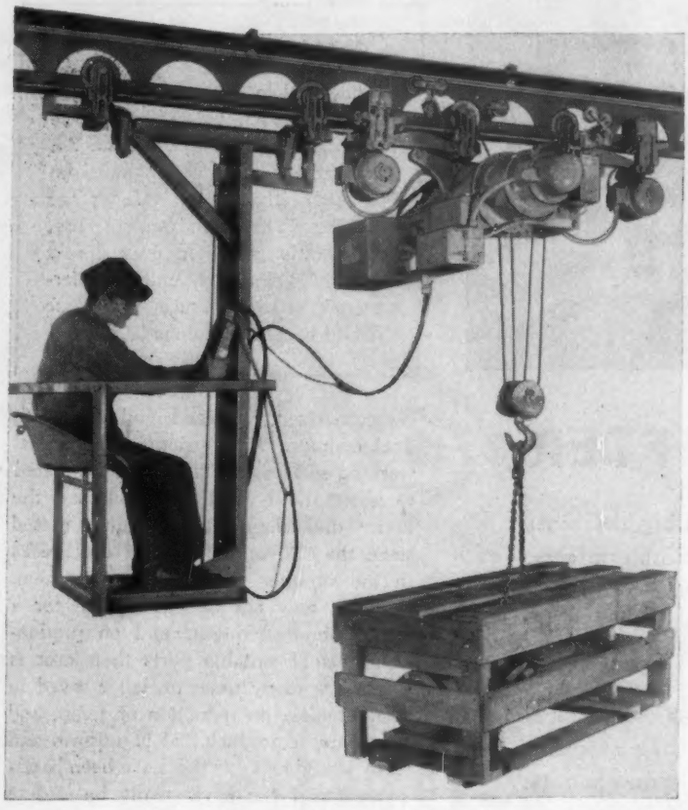
Parts to be quenched in dies must be clean and scale-free when they enter the die or the process is worthless. Sufficient oxide to color the part is tolerated but loose scale sets up an insulating air space that destroys the rapid cooling action entirely. Controlled-atmosphere heating often recommends itself although where the heating cycle on light parts is held to a minimum time in the furnace it is

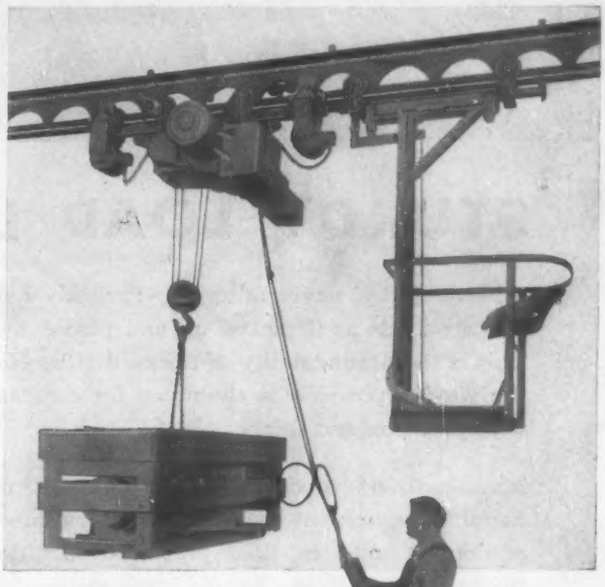
HOIST CARRIER OPERATED FROM FLOOR OR PLATFORM

Sometimes the need arises for a Tramrail unit that can be operated from either the floor or platform. The carrier illustrated, was designed to meet such a requirement.

For distant runs the operator takes the platform position; for local handling such as unloading trucks, he controls the unit from the floor.

The carrier is also advantageous where considerable material must be moved during some periods and relatively little during others. For instance, during the hours of the day shift when activity is high, two men might be employed at materials handling, one on the carrier platform and the other on the floor, hooking and unhooking the loads. During the other shifts when activity is light, all handling can be done with the Tramrail unit by one man on the floor.





• The unit illustrated is propelled by two motors and has an electric hoist of 4000 pound capacity. A foot-operated under-rail shoe brake quickly stops or holds the unit in place. Heavier capacity units available.

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possible to heat under oxidizing conditions rapidly enough to meet the scale limitations indicated above. This is frequently the best solution as the problem of handling thousands of small pieces in and out of a controlled-atmosphere furnace and keeping the atmosphere in it is a difficult one. Where scale is controlled by controlling the time in the furnace it must be done on a precision basis and the cycle held within a few seconds of the same time for each piece. Scale from previous operations must, of course, be entirely removed before the final heating for die quenching.

Dies are always made of heavy blocks of cold rolled steel of suitable size and are carburized, hardened, and ground to final contour. After grinding the actual working surfaces are hard chrome plated to about 0.001-0.0015-in. thick and the entire dies should be cadmium plated since the "sweating" of cold die blocks in the summer will quickly rust them. Die sets may not be out of line for a more complicated part and on production runs of suitable parts their cost is paid back many times on labor saved in straightening, on reduction of scrap, and on having a product that is uniform and really straight. Parts that have been hand-straightened can never really be said to be flat, they merely have a series of short kinks or bends approaching a mean that is flat whereas parts hardened on properly designed dies are truly flat within close tolerances.

Correction

The article "Standardization of Color", written by D. L. Hadley and C. B. Ryder, STEEL, Jan. 28, began on p. 121 and concluded on p. 186 of that issue. Under the heading "Definition" on p. 186, the notation for light gray should read 2.5 GY 6.0/.5; under "Tolerances", the difference for value should be plus or minus 0.05.

Steel Plant Directory

Directory of Iron and Steel Plants, 1946; 460 pages, 5 x 7½ inches; fabrikoid; published by Steel Publications Inc., 108 Smithfield St., Pittsburgh 30, for $10.

This is a new issue of this directory, which gives a list of companies and officials operating blast furnaces, steel plants, rolling mills, by-product coking plants, structural steel plants and boiler and tank shops in the United States and Canada.

Companies are presented alphabetically and geographically. The first section covers blast furnaces and steel plants, the second by-product coking plants.

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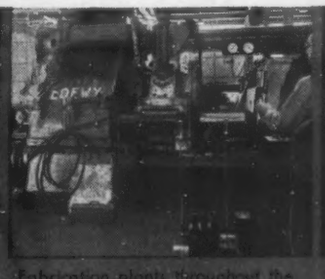

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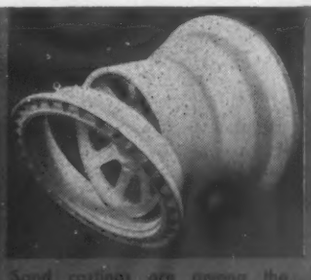

Sand castings are among the many forms of magnesium in common use today in consumer and industrial products.

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Hydraulic Power

(*Continued from Page* 134)

and rings, Fig. 1, will facilitate understanding of this description.

Each plunger makes two inlet and two delivery strokes per revolution, maximum travel being 9/16-in. Plungers are universally attached to an equalizing axle journaling two rollers, approximately 1⅜-in. diameter, which ride on the elliptical rings. This construction provides ample bearing areas for the plunger load components exerted radially and rotatively on the axle bearing surfaces and insures zero side loading of the plunger. Provision for a simple spring-type plunger return means is incorporated. This is insurance against failure of plungers to return when pumps are operated below the speed at which centrifugal force is adequate, or about 100 rpm.

In the variable-delivery type of pump, two banks of 11 plungers each are arranged in a single rotor, with the plungers in the two banks positioned in parallel relation. Each pair of parallel cylinders is in open communication by means of a drilled passage in the rotor, as illustrated in Fig. 2.

Rings Rotate Oppositely

The plunger rollers of each bank roll against a separate elliptical reaction ring. The two rings are separately mounted in the pump housing and are geared together through bevel gears and pinion so that they rotate in opposite directions in response to rotation of the volume control pinion.

At full delivery the major axes of the elliptical reaction rings are parallel, while at zero delivery the major axes are 90° apart. This can be understood from the fact the displacement of the plungers moving radially outward exactly equals the displacement of the plungers moving radially inward in both delivery quadrants and in both suction quadrants, thus giving zero net delivery. As the two axes are moved toward a parallel position, net plunger displacement increases, and when they are parallel both plungers of a pair again reciprocate in phase through full delivery and suction strokes.

With the rings in zero delivery position, it is obvious they may be moved in either of two directions toward a parallel position. This makes possible an interesting application of the pump as far as direction of flow of the pressure fluid or power is concerned. In one way from the zero position the flow will be in one direction; the other way, in the opposite direction. With the fluid lines connected to a hydraulic motor, for example, it is possible to exert both a braking and reversing effect on the motor by reversal of the pressure flow from the pump.

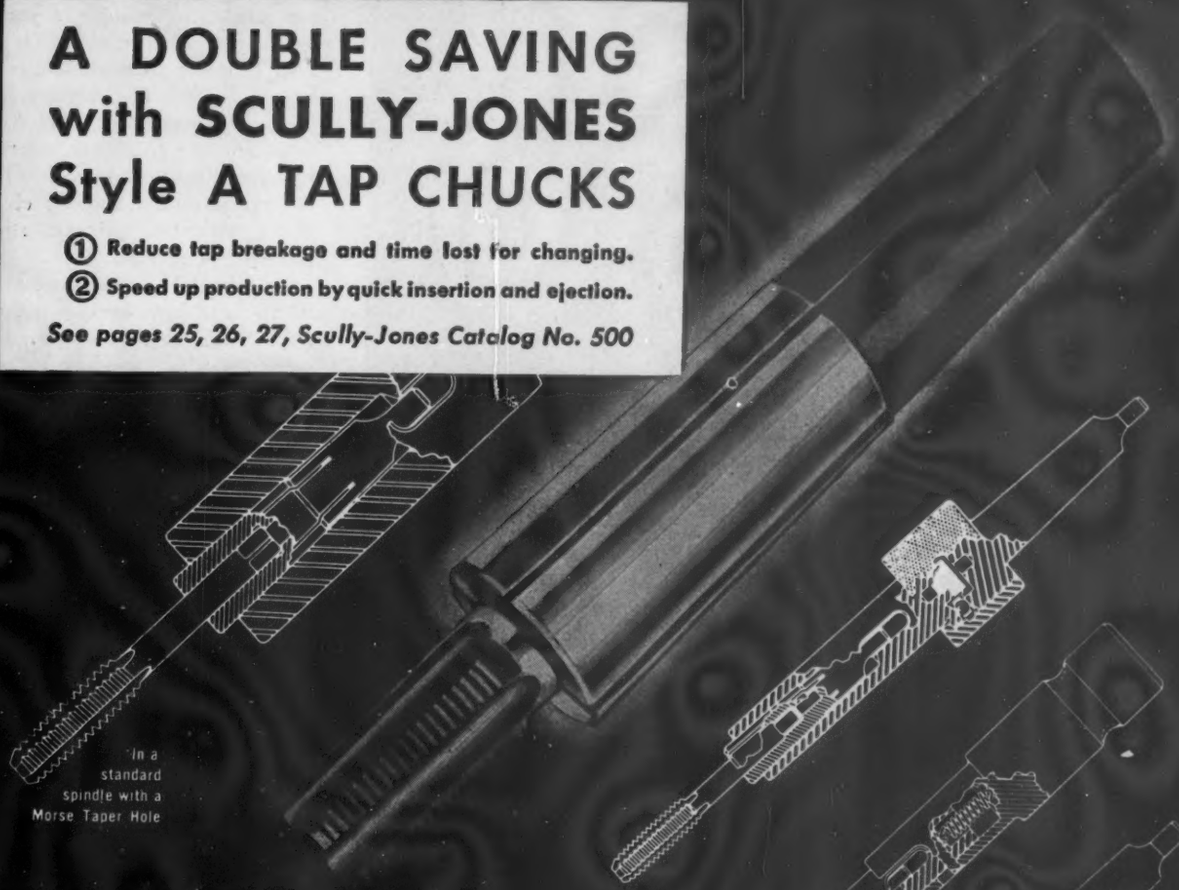
This at once suggests power possibil-

A DOUBLE SAVING with SCULLY-JONES Style A TAP CHUCKS

① **Reduce tap breakage and time lost for changing.**

② **Speed up production by quick insertion and ejection.**

See pages 25, 26, 27, Scully-Jones Catalog No. 500



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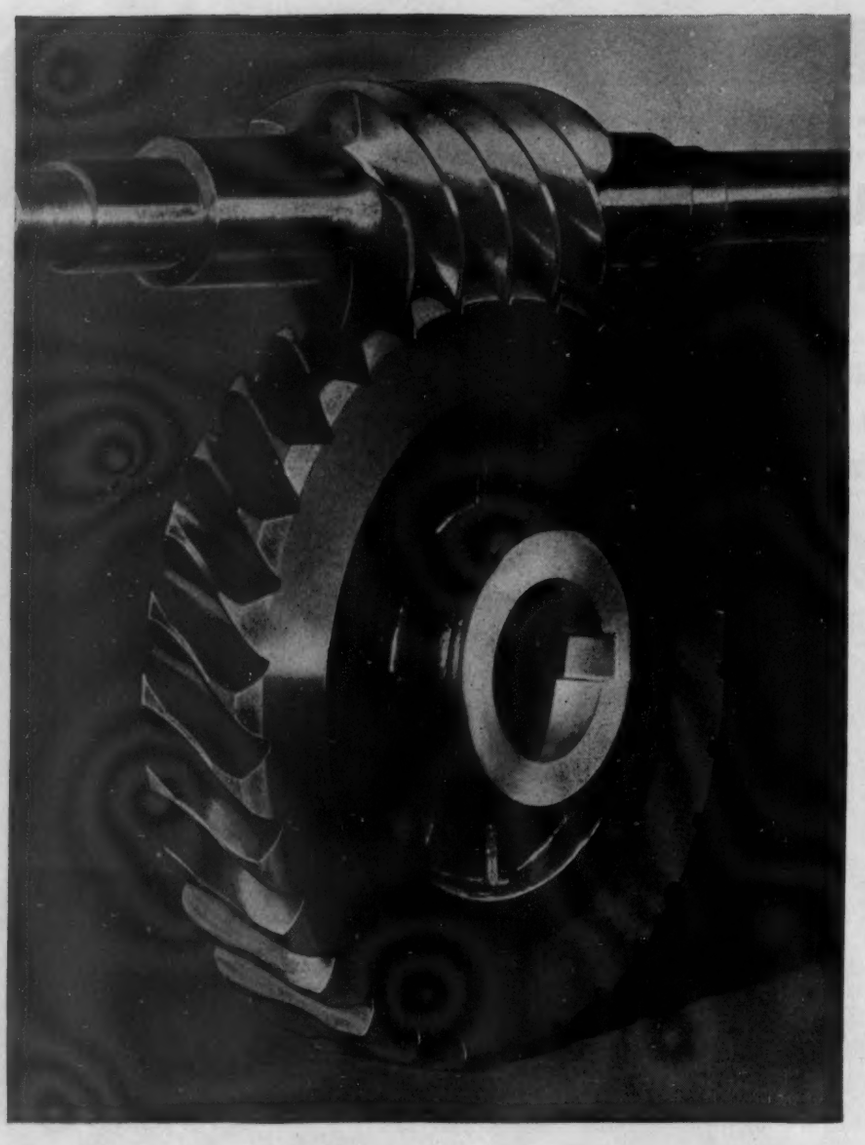

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ities in mobile equipment drives, and this indeed is now being subjected to study by automotive interests and others. On an automobile, for example, a pump might be directly connected to engine and fluid lines run to small motors on each wheel. The variable delivery feature of the pump would in effect be comparable to an infinitely variable transmission, from zero speed up to the maximum speed of the pump rotor, assuming of course a motor with two pressure strokes per plunger per revolution.

Actually, in pump-motor hookups which have been developed thus far by Superdraulic engineers motors have been equipped with three-lobe cam rings instead of elliptical reaction rings, thereby providing three plunger strokes per revolution and providing top speed two-thirds that of the pump. Full possibilities of this type of hydraulic transmission have yet to be explored.

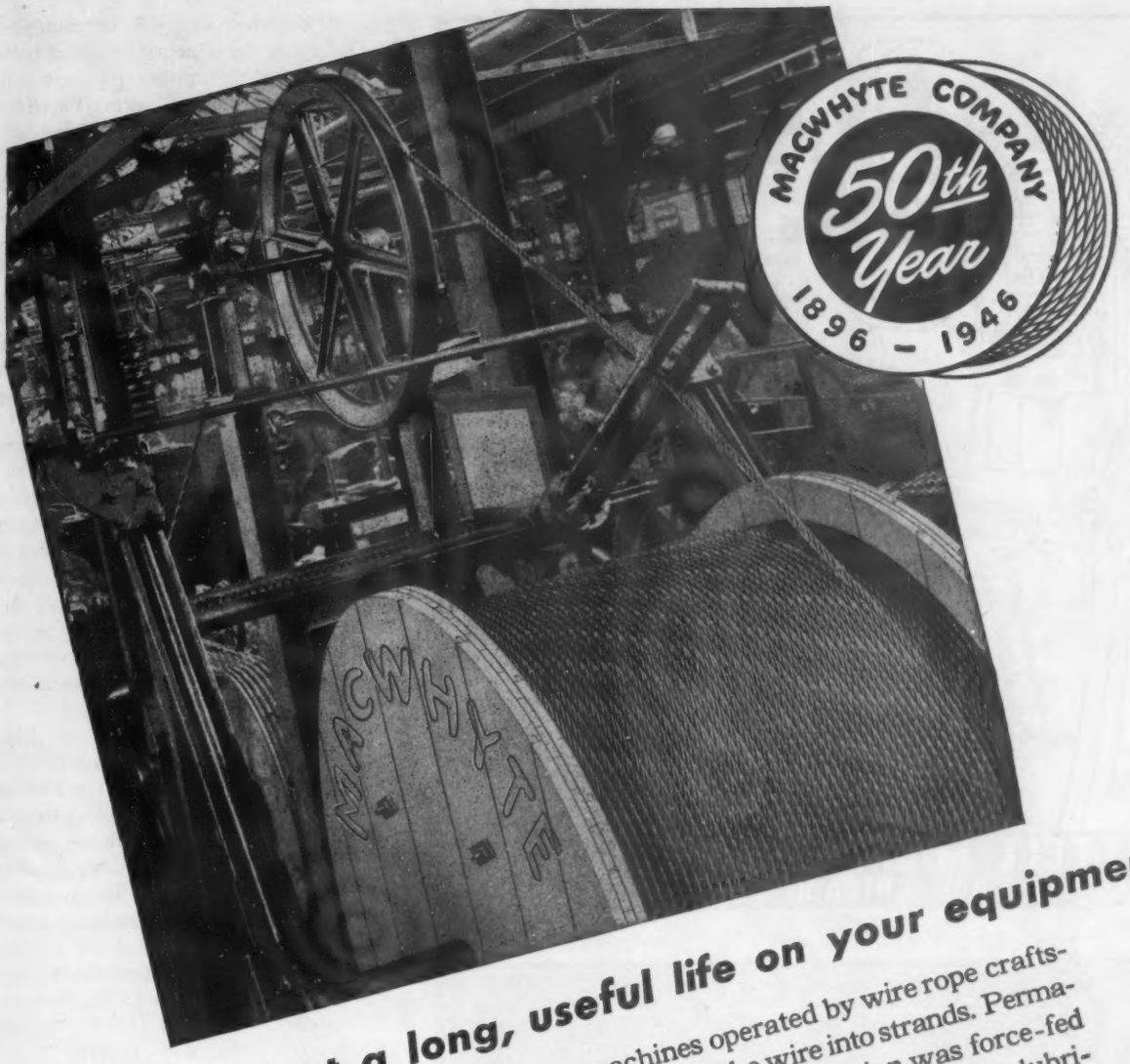
Variable delivery pumps may be equipped with any one of a number of different type volume controls which may be interchangeably mounted on the pump. The sensitive manual dial type control may be mounted on either side. A surge-proof balanced pressure compensator is constructed to mount on either side also, with a volume dial indicator mounted on the side opposite the pressure compensator.

Controls Are Interchangeable

Plunger reaction loads exerted on the elliptical reaction rings are balanced through the volume control gear, the torque of one reaction ring balancing that of the other. Thus, light and sensitive manual or automatic pressure and volume controls can be used interchangeably. The entire design of the unit inherently is in hydraulic balance, since suction quadrants and delivery quadrants are diametrically opposite in the four quadrants of the elliptical reaction ring. Thus balance exists between pintle and rotor; also between plungers and rotor. Further, there is zero side loading of pintle and plungers.

High horsepower in a hydraulic pump or motor is a function of high pressure plus high volume of delivery. Pressure and delivery in turn are partly a function of the number of plungers per pump and the number of strokes these plunge make per revolution. By using two banks of 11 plungers, each of which makes two strokes per revolution, it is possible to develop pressure and delivery, i.e., horsepower, at approximately twice the level for the same size of conventional type hydraulic pump, according to Superdraulic engineers.

The pump provides a full range of applications, delivery at 1200 rpm being variable between zero and 17 gpm maximum. If greater delivery is required,



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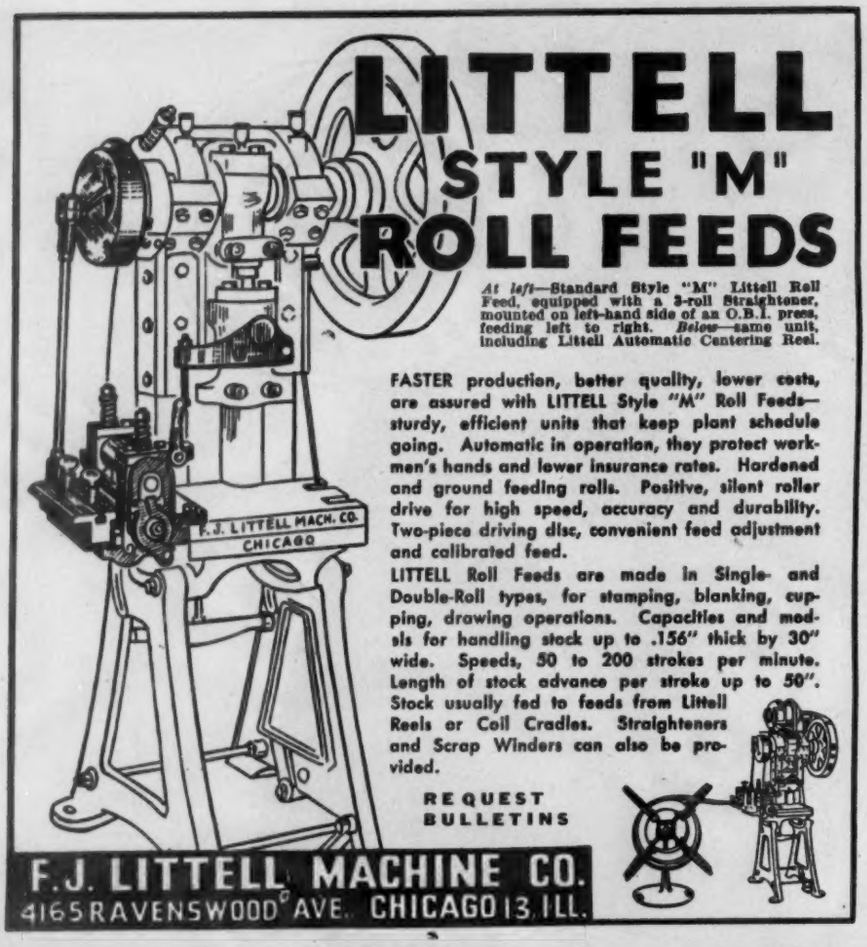

LITTELL STYLE "M" ROLL FEEDS

At left—Standard Style "M" Littell Roll Feed, equipped with a 3-roll Straightener, mounted on left-hand side of an O.B.I. press, feeding left to right. *Below*—same unit, including Littell Automatic Centering Reel.

FASTER production, better quality, lower costs, are assured with LITTELL Style "M" Roll Feeds—sturdy, efficient units that keep plant schedule going. Automatic in operation, they protect workmen's hands and lower insurance rates. Hardened and ground feeding rolls. Positive, silent roller drive for high speed, accuracy and durability. Two-piece driving disc, convenient feed adjustment and calibrated feed.

LITTELL Roll Feeds are made in Single- and Double-Roll types, for stamping, blanking, cupping, drawing operations. Capacities and models for handling stock up to .156" thick by 30" wide. Speeds, 50 to 200 strokes per minute. Length of stock advance per stroke up to 50". Stock usually fed to feeds from Littell Reels or Coil Cradles. Straighteners and Scrap Winders can also be provided.

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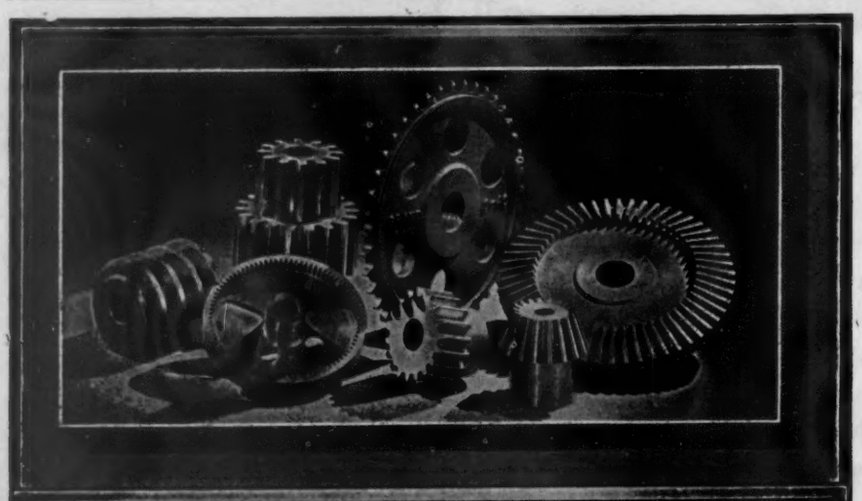

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pumps can be arranged in multiple.

Leakage is the principal source of both heat in some high pressure pumps and reduction of overall efficiency. Its effect is minimized as speeds increase, but advantage is taken of leakage in the radial type pump to lubricate axles, rollers and the joint between the plunger and axle. Close examination of the inset in Fig. 3 will show a small slot milled in opposite sides of the plunger at its midsection. Drilled holes provide passages from these slots to the "tongue" which fits into a mating slot in the axle, and leakage can follow this path to lubricate the moving parts.

Further, a small oil circulating pump is incorporated for the purpose of circulating oil under near zero pressure direct from the oil tank through the pump housing and back to the tank. This is said to insure sufficiently low pump housing temperatures of the variable delivery pump under the condition of extreme pressure operation at zero or near zero delivery when heat conditions are at their maximum.

Pump housing is of alloy cast iron, while moving parts generally are of alloy steel, precision machined, in the case of plungers, to tolerances of around 0.0001 in. Plungers and cylinder bore are ground and lapped, and while selectively fitted at present, eventually will be precision honed to make them completely interchangeable. Compact size of the variable delivery unit can be appreciated from the fact overall height is 11 in., diameter of the circular housing 10½ in., overall width 14¾ in., and overall length 16 15/16 in.

"Tailoring in Metal" Title of Welding Guide

A new engineering manual entitled "Tailoring in Metal," is offered by United Welding Co., Middletown, O. It discusses factors affecting choice of welded fabrication and techniques of welded design. As stated by the author, purpose of manual is to help engineers and designers decide for themselves if fabrication by welding and materials made available by this method are applicable to the problem. Factors involved in a decision are cost, weight, strength, appearance, stability, noise, quality, and delivery.

Various types of welds are explained, as well as how they affect static and fatigue load values. There is specific information about devices which can be employed to reduce cost and improve construction. Methods are illustrated with drawings and photographs. Among its topics are application of welding to gear blanks, pulleys, tanks, casings, housings, frames, breechings, stacks, etc.

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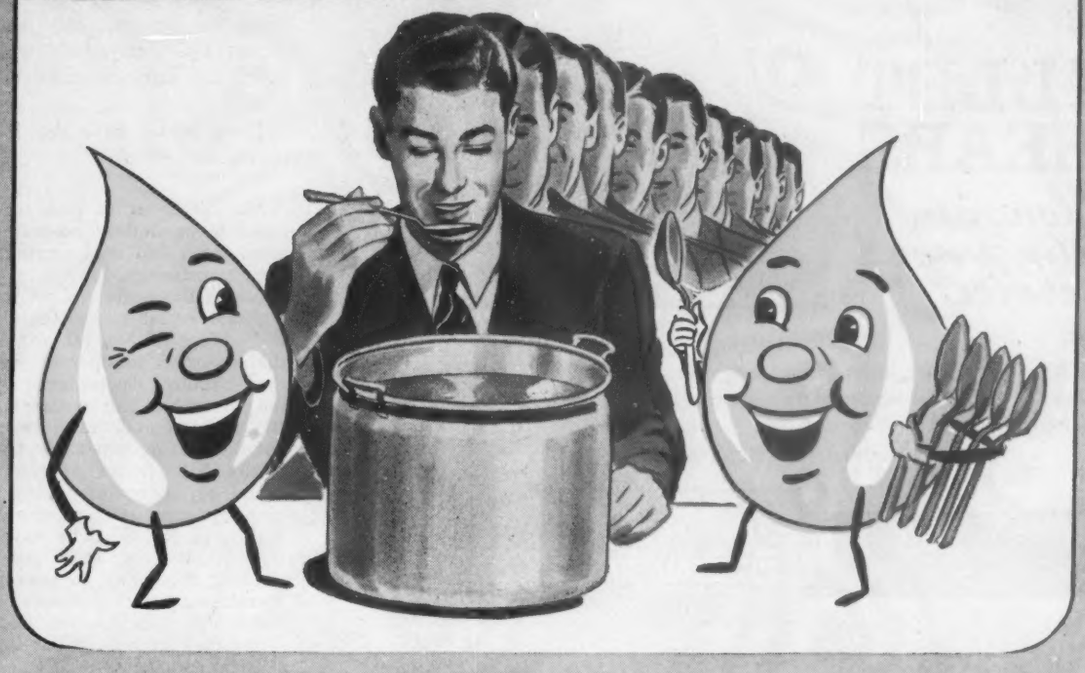

They even made a TASTE TEST of a SHELL RUST PREVENTIVE!

PROBLEM: Specifications in contract for making U. S. Army cooking kettles called for a protective coating that came off easily with cold water. Absolutely no taste or odor could remain. The manufacturer preferred a coating to be applied by dipping at room temperature.

SOLUTION: When the Shell Lubrication Engineer surveyed the problem, he recommended a Shell Ensis Oil. As a test, this material was applied to utensils of the plant cafeteria. These were washed in cold water—then placed in normal use. *Not one employee could detect the slightest trace of the Rust Preventive used.*

CONCLUSION: It pays to consult the Shell Lubrication Engineer, regardless of the nature or size of your lubricating problem. Write for a copy of Shell's 40-page booklet on Rust Preventives. Shell Oil Company, Incorporated, 50 West 50th Street, New York 20, New York; or 100 Bush Street, San Francisco 6, California.

No one really cares what a Rust Preventive tastes like, but the maker of U. S. Army cooking kettles had to be sure that the Rust Preventive could be completely removed *so that it would not taste!*

SHELL RUST PREVENTIVES

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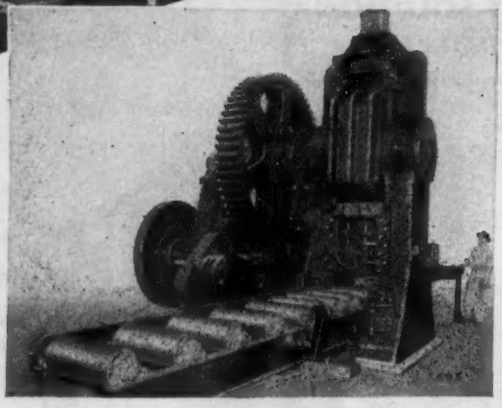

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NEW YORK AKRON DETROIT CHICAGO LOS ANGELES TORONTO

Modern Arc Furnace

(*Continued from Page* 148)

Normally, closed contacts of 50X short permitting them to operate at all times circuit the transformers of 51T's, thus except when 50X is picked up. Normally open contacts of 50X short circuit the transformers of 51F's permitting these relays to function only when 50X is picked up. Relays 50, which actuate 50X, are instantaneous-overcurrent relays.

These relays have the following approximate settings:

No. 50 is set to pick up at a value equal to or slightly exceeding the maximum rated full load current of the furnace transformer.

No. 51F has its tap set to pick up at a value equal to or slightly less than the setting of No. 50 and has its time dial adjusted to operate the relay with short-circuited electrodes in approximately 90 per cent at the maximum time which the furnace and transformer can withstand short-circuited electrode current.

No. 51T is set at the current tap equal to or nearest above the highest primary current corresponding to the setting of No. 50. The time dial of No. 51T is set as short as possible without causing the relay to operate on transformer-magnetizing inrush currents. This value can best be determined by trial. Time dial settings of less than 1 are not recommended.

No. 151 is set at the current tap equal to or nearest above the combined settings of the No. 51T relays on all furnaces being fed from the furnace bus. The time dial is set as short as possible without losing selectivity with No. 51T's. Time dial settings of less than 1 are not recommended.

The heart of the system is the instantaneous short circuit, selective relay No. 50. This device immediately determines whether overcurrent is the result of a furnace disturbance or a fault in the transformer zone. By means of its auxiliary No. 50X, it directs the action to be taken by the overcurrent relays No. 51F and No. 51T. If the overcurrent is occasioned by a furnace disturbance, No. 50 and No. 50X release No. 51F for operation and block any tendency of 51T to operate.

On the other hand, if the fault is in the transformer zone, No. 50 and No. 50X remain dropped out and No. 51T is free to clear the fault. Thus, faults in the transformer zone which are likely to be greater than the interrupting capacity of furnace breaker No. 52 are cleared by the back-up breaker No. 152 while the more frequently encountered furnace disturbances of lower magnitude are cleared by furnace breaker No. 52 without interference with operation of other furnaces.

The blocking action of relay No. 51T during furnace disturbances permits the

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The directional valves may be manually or automatically controlled. A three-quarter turn of the manual valve directs the carbon dioxide to the correct nozzles. In automatic operation, the heat detectors in the threatened space actuate the valves.

Full details may be obtained from Walter Kidde & Company, Inc.

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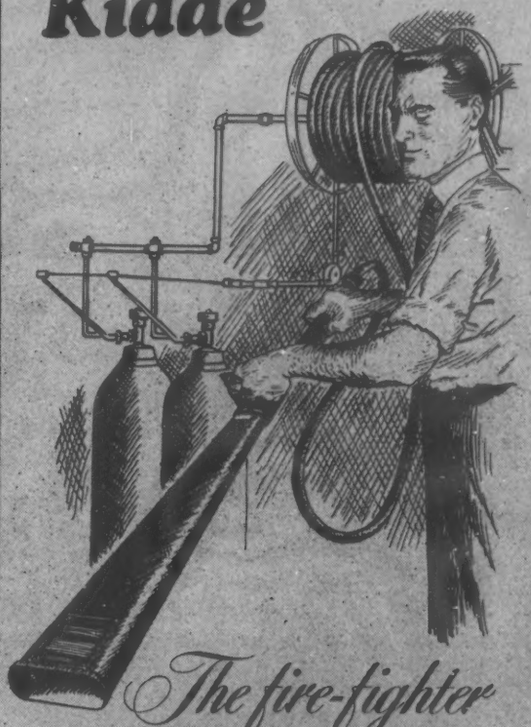

The fire-fighter with a 50-foot swing

Kiddie Hose Reels pack a real - fire - killing wallop. Hose length up to 150 feet gives operator plenty of freedom for action in extinguishing flames. New light-weight reel. Supplied with one or more 50 - pound cylinders of carbon dioxide.

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The word "Kidde" and the Kidde seal are trade-marks of Walter Kidde & Company, Inc.

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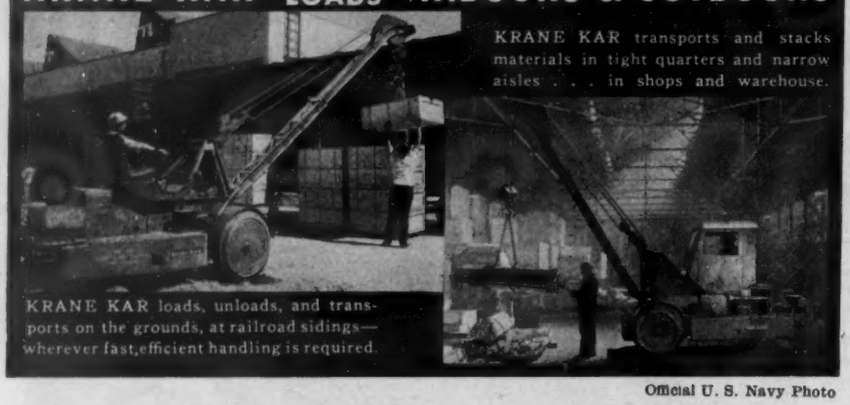
GI Students Ask VA

General output at factories and mines decreased 4 per cent in October, while in the first half of

Home from Manila,

stationed in a little town in France for several months, wooed a French girl by telling her

KRANE KAR HANDLES LOADS INDOORS & OUTDOORS



KRANE KAR transports and stacks materials in tight quarters and narrow aisles . . . in shops and warehouse.

KRANE KAR loads, unloads, and transports on the grounds, at railroad sidings—wherever fast, efficient handling is required.

Official U. S. Navy Photo

KRANE KAR clears a door only 7 feet high! This low overall height is combined with a short turning radius of 12 feet. Add to these features the flexibility of a "live" boom . . . forward and reverse travel . . . automatic load and boom braking . . . unobstructed vision . . . safe and easy operation — *and you have an unexcelled materials-handler in close quarters, indoors and outdoors!* Write for Catalog No. 58.

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THE ORIGINAL SWING BOOM MOBILE CRANE WITH FRONT-WHEEL DRIVE AND REAR-WHEEL STEER

2½, 5, AND 10 TON CAPACITIES

KRANE KAR

TRADE MARK REGISTERED

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HANNATEN IRON INGOT

10 POUNDS

THE BEST KNOWN NAME IN IRON

10 POUNDS . . . for easier handling, more accurate control of the charge, finer grain structure of the iron. That's the story of the new HannaTen ingot, available in all grades of Hanna iron. Take advantage of this important development in "better iron for better castings" . . . from Hanna.

GRADES:
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SILVERY
FOUNDRY
MALLEABLE
FERRO-SILICON

BRANDS:
SUSQUEHANNA
BUFFALO
DETROIT

The Hanna Furnace Corporation

Merchant Pig Iron Division of National Steel Corporation

BUFFALO • DETROIT • NEW YORK • PHILADELPHIA • BOSTON

use of a much lower and faster setting on No. 51T than would be possible if No. 51T setting were made selective with that of No. 51F. Higher speed clearing of transformer faults result from such a setting of No. 51T.

Another important function performed by No. 50 is that of permitting the immediate and rapid resetting of induction relay No. 51F after an overcurrent of sufficient magnitude to cause the relay to move but of too short a duration to close the contacts. Such transient overcurrents occur very frequently in normal furnace operation, being the result of slipping charges which short circuit the electrodes during the meltdown period. Recovery from such overcurrents is normally provided by the automatic control of the electrodes. Immediately that such recovery occurs the current is reduced to normal and relay No. 50, having a high drop-out, (approximately 90 to 95 per cent of pickup) drops out, thus removing all torque from No. 51F. Without this feature No. 51F might be "notched up" to close its contacts by a rapid succession of transient overcurrents.

Furnace Electrode Control Gear: The efficient operation of an arc furnace is dependent upon fast, accurate, and continuous adjustment of the electrodes to maintain the correct kilowatt input to the furnace. Since furnace conditions affecting the input are constantly changing, very frequent adjustments of electrode position are required and manual adjustment requires the almost constant attention of the operator.

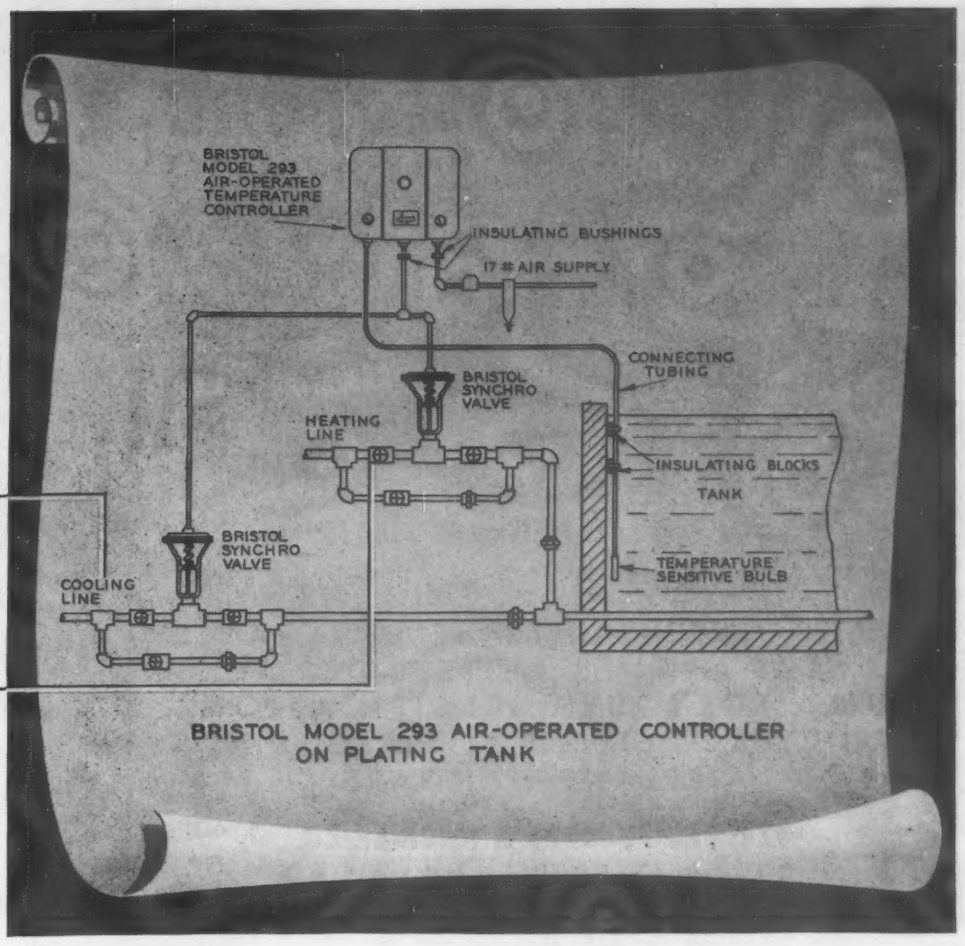
Automatic control of the electrodes was therefore early recognized as a necessity. Such control by means of relays and magnetic contactors was the original solution to this problem. However, the almost continuous operation required of the control, when designed for fast accurate operation, introduces a serious problem of regulating equipment maintenance. In addition, the magnetic equipment is complicated and requires skillful adjustment in order to assure satisfactory performance

The amplidyne generator provides an excellent solution to these problems. Regulating equipment fulfilling the requirements of speed, accuracy, ease of adjustment, and simplicity has been designed using the amplidyne generator as a combined regulating means and source of power for the electrode motors.

In addition to providing adequate automatic control, a complete control equipment must also provide for easy manual control of the electrodes during replacements and adjustments This feature is easily and simply provided as part of the amplidyne regulating equipment.

Completely co-ordinated control and

NEVER TOO HOT NOR TOO COLD



BRISTOL MODEL 293 AIR-OPERATED CONTROLLER ON PLATING TANK

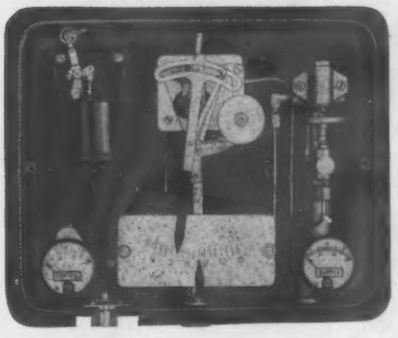
How to improve quality of plating by keeping the bath at the right temperature

Bristol's new Model 93 Air-Operated Controller puts temperatures under accurate and continuously uniform control with accurate readings continuously indicated.

It is the ideal instrument for controlling temperatures of all types of plating, cleaning and pickling tanks, where chart records are not needed.

A new bulletin, No. A115, gives complete details. Write for a free copy to THE BRISTOL COMPANY, 149 Bristol Road, Waterbury 91, Conn. (The Bristol Co. of Canada, Ltd., Toronto, Ontario. Bristol's Instrument Co., Ltd., London, N.W. 10, England.)

Bristol's Model 93 Air-Operated Indicating Controller. Other Bristol instruments for these applications include recording air-operated controllers, electrically-operated (mercury contact) indicating or recording controllers, and open-contact indicating controllers. These Bristol instruments are described in Data Sheet No. 45.



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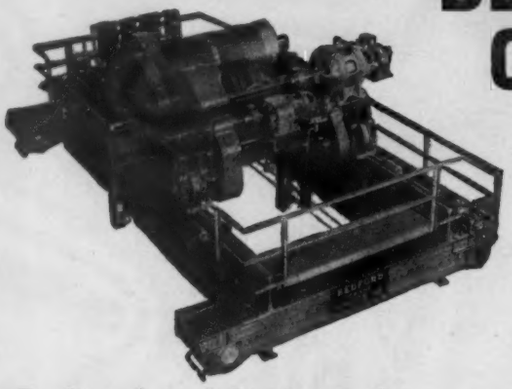

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BEDFORD FOUNDRY & MACHINE CO.
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Gray Iron Castings

—so shall you sleep—to awaken refreshed for a busy day in industrial Detroit. Those coveted inner-springs (out for the duration) are still with us!

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800 OUTSIDE ROOMS ALL WITH PRIVATE BATH . . . SINGLE FROM $2.50 . . . DOUBLE FROM $4.00

Charles H. Lott, General Manager

regulating gear such as that illustrated in Figs. 6 and 7 provides for:

Complete automatic control
Complete manual control
Simultaneous automatic control of one or two electrodes and manual control of the remainder.

The essential elements of a modern amplidyne control and regulating gear are shown in schematic diagram Fig. 4.

The driving power for each electrode motor No. 88E is derived from an individual amplidyne generator No. 88G. The amplidyne generators are driven by individual motors No. 88M supplied from any available source of auxiliary power, usually 230 or 460-v, 3-phase ac. A control switch-operated contactor No. 42 is provided for starting the driving motors of the amplidyne generators and each driving motor and amplidyne generator is provided with a thermal-protective relay No. 49-68.

Interlocks are provided on the starting contactor to prevent closing the furnace breaker unless the contactor is picked and to trip it if the contactor drops out. The electrode motors are controlled by varying the magnitude and direction of excitation of the amplidyne generator fields, either automatically in response to current and arc voltage conditions in the furnace, or manually in response to control switches No. 96 and 96M.

Automatic Control is provided by exciting field F1-F2 of each amplidyne generator from a source of voltage which is proportional to the departure of arc voltage and arc current from a predetermined ratio. To provide this source of voltage two rectifiers are used, one of which rectifies a voltage derived from the arc voltage, and the other a voltage derived from a resistor in the electrode C T. secondary circuit. A portion of the rectified arc voltage taken from a potentiometer adjusting rheostat and the rectified C. T. resistor voltage are connected in series opposition to provide excitation to the amplidyne field.

When a difference exists between these two rectified voltage components, the amplidyne is so excited as to cause the electrode to move in the direction required to bring the current and voltage components into equality. When such equality is reached the amplidyne excitation is zero and the electrodes remain stationary. Fig. 2 is a graphic representation of these relations. The adjusting rheostat provides a means by which the operator may set the desired kilowatt input to the furnace. It provides a range of 0 to 110 per cent of maximum furnace rating.

In order to avoid major re-adjustment of the adjusting rheostat when the furnace transformer voltage taps are changed, compensating resistor shunted by con-

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"These mold parts are for the aircraft and automotive industries. We use Speed Case and Speed Treat Plate exclusively for all rubber and plastic molds."

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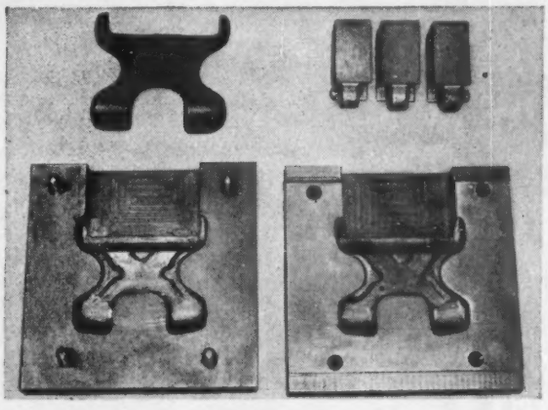
LOS ANGELES, CALIFORNIA

10 Reasons why-



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Speed Treat **Plate (X-1545) machines at least 30% faster than other corresponding medium carbon steels. It combines excellent physical properties with high tensile strength and adaptability to hardening, with minimum distortion. Send for Catalog 1243. Consult your nearest distributor for sizes, flame cutting and deliveries.**

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3 Through minimized mold breakage.

4 Through better finish which lessens grinding and polishing.

5 Through freedom from distortion.

6 Through elimination of costlier high alloy steels.

BETTER MOLDS

7 Through excellent physical qualities.

8 Through uniform core toughness and surface hardness.

9 Through better finish.

10 Through long mold life.

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Plants: Hammond and Indianapolis, Indiana

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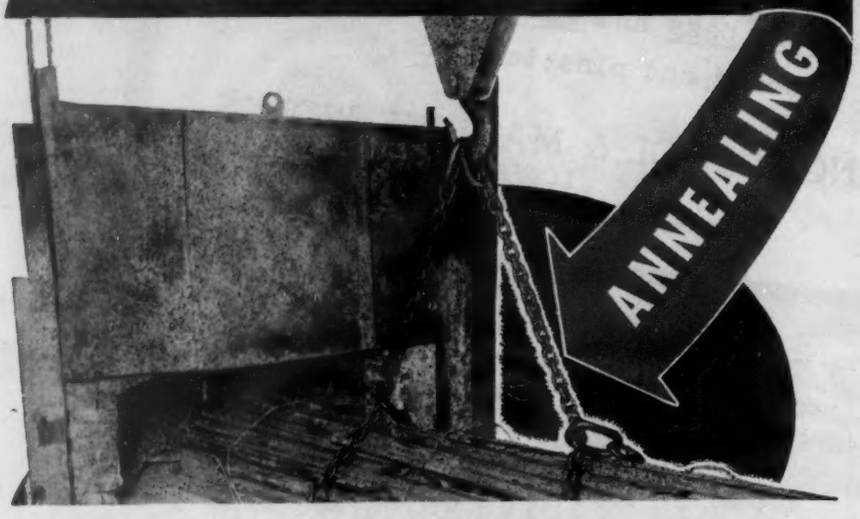

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Loading and unloading facilities are exceptional.

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GEAR PRODUCTION PROBLEMS?

Check with Fairfield

Left: There are more than 50 of these Gleason Generators in the spiral bevel gear department.

THE next time you have a tough problem on the production of gears, differentials, splined shafts or allied items, check with FAIRFIELD.

FAIRFIELD'S unusual ability to produce on time, and up to specifications is the result of enough of the very best equipment, skilled craftsmen and an experienced engineering staff. The gear cutting departments making spiral, bevel, hypoid, zerol, straight bevel, spur, helical and worm gears, are well equipped to handle tough production assignments and FAIRFIELD'S automatic turning, grinding and heat treating departments work closely with the gear cutting departments. Result: fast, smooth production.

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ARMY E NAVY
FAIRFIELD for FINE GEARS

tacts of tap changer position auxiliary relays No. 33TZ are inserted in the ac supply to the voltage rectifier.

Before the furnace arc is struck there is no current in the electrodes, and excitation for the amplidyne to lower the electrodes is obtained solely from the voltage rectifier. Since the initial lowering of the electrodes should be at a definite speed and independent of the setting of the adjusting rheostat, the amplidyne excitation is initially taken direct from the voltage rectifier through a resistor selected to give the desired lowering speed. When the arc is struck and current flows in the electrode circuit, the current component of excitation picks up relay 93 which transfers the excitation circuit from the initial lowering resistor to the potentiometer adjusting rheostat.

When necessary, limit switches are provided to cut-off excitation whenever the electrode mechanism reaches either limit of its travel.

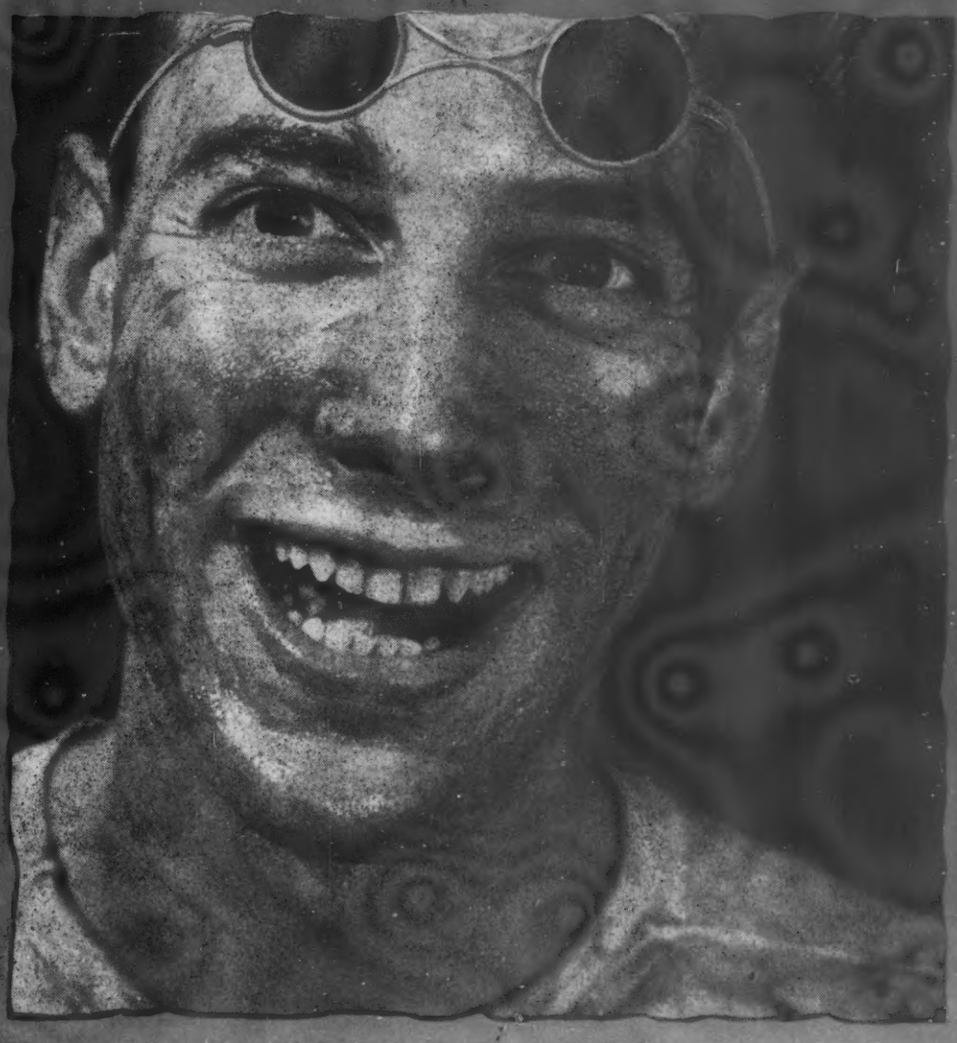
In order to drive the electrode motor at approximately the same speed in both directions it is sometimes necessary to apply slightly more excitation in the up direction than in the down. This is accomplished by a differentially connected self-excited field F7-F8 on the amplidyne. A resistor partially by-passed by a blocking rectifier is inserted in the circuit of this field so that when the amplidyne polarity is such as to raise the electrodes the resistor is effective in reducing the differential action of the field and when it is such as to lower the electrodes it is by-passed by the rectifier and the field acts to reduce the net excitation.

This differential field also serves as a "suicide" field to quickly kill the residual in the amplidyne field structure when other sources of excitation are removed, and as a stabilizing field. The stabilizing action is increased by a capacitor connected in parallel with the resistor.

In order to prevent excessive excitation when the arc is struck or the electrodes short circuited by a shifting furnace charge, a reactor is provided in parallel with the resistor in the C. T. secondary. This reactor is designed to saturate at high currents and thus limits the voltage appearing across the resistor.

Manual Control for raising the electrodes at the end of the heat is by means of a master electrode control switch No. 96M which controls all three electrodes simultaneously or by three individual electrode control switches No. 96 which control the electrodes separately. These switches are provided with contacts operated by pulling the handle out, as well as contacts operated by turning the handle to either the raise or lower position. When the handle is pulled out, all raise and lower contacts are open.

ASK THE MEN WHO LOOK IN THE FURNACE *ABOUT* MAGDOLITE



"NO HOLES! CHARGE UP!"

Bad Bottoms are time and money wasters . . . "Make Up" with MAGDOLITE for lower refractory costs, increased furnace efficiency by less "time out" . . . fewer Bad Bottoms. Experienced steel men look in the furnace and actually SEE the difference. Order a carload and see for yourself—MAGDOLITE stays put!

5 ways better
COMPOSITION
QUALITY
STRENGTH
PREPARATION
ECONOMY

MAGDOLITE!

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American "5000" Marking Crayon—the perfect permanent mark for all rough and smooth surfaces. Ask your dealer or distributor for American "5000" Markers.

Dept. L-19

THE AMERICAN CRAYON COMPANY

The pull contacts are operated and the switch is locked in the neutral position to prevent turning the handle. In this position the amplidyne is under automatic control.

When the handle is pushed in, the automatic control field circuit is opened and the handle is free to turn. The operator may then operate the electrode by turning the switch to energize the manual control field of the amplidyne from a separate dc source.

The master control switch has contacts which operate all electrode controls simultaneously. If it is desired to operate one electrode in one direction and the other two in the opposite direction simultaneously, the individual control switch can be turned in one direction and the master control switch in the opposite, the individual switch being arranged to take precedence over the master switch when its handle is pushed in. Any electrode may be placed under manual control by pushing in its control switch handle. The remaining electrodes will continue under automatic control.

Control of the transformer tap changer is by means of a switch which controls the motor-driven, tap-changing mechanism. The circuits of this control are interlocked so that the tap cannot be changed unless the furnace switching circuit breaker is open and the control of the latter is interlocked to prevent closing unless the tap changer mechanism is on a tap position. Indicating lamps are provided to show the position of the tap changer.

Instruments and meters required for furnace operation are provided as follows:

A voltmeter connected alternatively by a transfer switch to read arc voltages or phase-to-phase furnace voltages.

A wattmeter to read total 3-phase input to the furnace.

A watthour meter with high-speed register to register kilowatt hours input to the furnace.

Three ammeters to read current in the furnace electrodes.

Furnace Operation: Economical operation of an arc furnace is obtained at the optimum current for the selected voltage or at some lower current as may be dictated by considerations of power-factor efficiency or the amount of power available. Fig. 5 shows typical relationships between power factor, power input, efficiency, and optimum current. It will be noted that increasing the current beyond the optimum value decreases the power input to the furnace and increases the losses.

Furnace transformers and circuits usually are designed with such values of reactance at the various voltage taps that the optimum current is approximately the same for all taps. Any small variations in optimum current found to exist are easily compensated for by a slight readjustment of the adjusting rheostats.

Optimum current values are obtained by slowly increasing the electrode current with the adjusting rheostats to the point of maximum wattmeter reading. As shown on Fig. 3 the wattmeter reading will decrease if the current is increased beyond the optimum value.

As the furnace charge passes from the solid to molten state, the power requirements decrease. In order to avoid unnecessary melting of the furnace linings, power input is usually reduced at this point by changing to a lower voltage tap on the transformer.

Pressed Metal Exposition

(*Concluded from Page* 132)

tion were Acklin Stamping Co.; E. W. Bliss Co.; Donovan Wire & Iron Co.; Dura Division, Detroit Harvester Co.; Great Lakes Stamping Co.; Klopping Stamping Co.; Leake Stamping Co.; Metal Electric Processing Co.; New Delphos Mfg. Co.; Paramount Engineering Co.; Peters Stamping Co.; Prestole Division, Detroit Harvester Co.; Reichert Float & Mfg. Co.; Reliance Steel Co.; Detroit Steel Corp.; Superior Stamping & Spinning Co.; Toledo Pressed Steel; Toledo Stamping & Mfg. Co.; and Wayne Metal Products Co. F. C. Greenhill, president of Acklin Stamping, is national president of the Institute; Walter T. Baird is district chairman; and Wilfred Williams was general chairman of the exposition.

Making of Punches and Dies by Simple Means

Simplified Punch and Diemaking, by James Walker and Carl C. Taylor; cloth, 235 pages, 5½ x 8½ inches; published by McMillan Co., New York, for $5.

This volume has been written for readers interested in design, construction and operation of punches and dies. Much needed material not heretofore published has been included as an aid to the designer, machinist, toolmaker, diemaker, sheet metal worker or producer of any article manufactured advantageously by means of dies in presses. Approach is novel, the first chapter being an introduction to the broad field of diemaking, giving sufficient general information to prepare the beginner for later diemaking instruction.

Successive chapters deal with dies of increasing complexity until all commonly used types have been covered. Obsolete processes, designs and methods have been avoided, presenting exclusively the design, use and adaptation of the many sets of tools illustrated. Rules, tables and a glossary of shop terms are provided, to answer questions quickly.

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MOLD AND HOB STEEL
In the manufacture of plastic products, there is no factor of greater importance than the selection of mold and hob steels. The choice of the right steels not only helps to eliminate production difficulties and to assure a perfect product, it also helps to keep manufacturing costs at their proper level. Whether your manufacturing method calls for injection or compressive molding, select your steels with care.
BASIC REQUIREMENTS
For most applications, mold steels should be of low carbon content —soft enough to permit easy hobbing and machining, yet capable of developing sufficient hardness to keep from distortion and resist excessive wear. In order to produce smooth, clean cavities, the steel should be fine-grained—free from porosity and surface irregularities and properly annealed.
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the BUSINESS TREND

PESSIMISM growing out of failure to get the nation's production machinery into high gear has begun to make itself felt and may measurably curb the current inflationary psychology. An important manifestation of this pessimism was the wide break in the stock market last week when Wall Street was concerned over a darkening earnings outlook resulting from skepticism about the government's price-wage program and persistence of labor troubles.

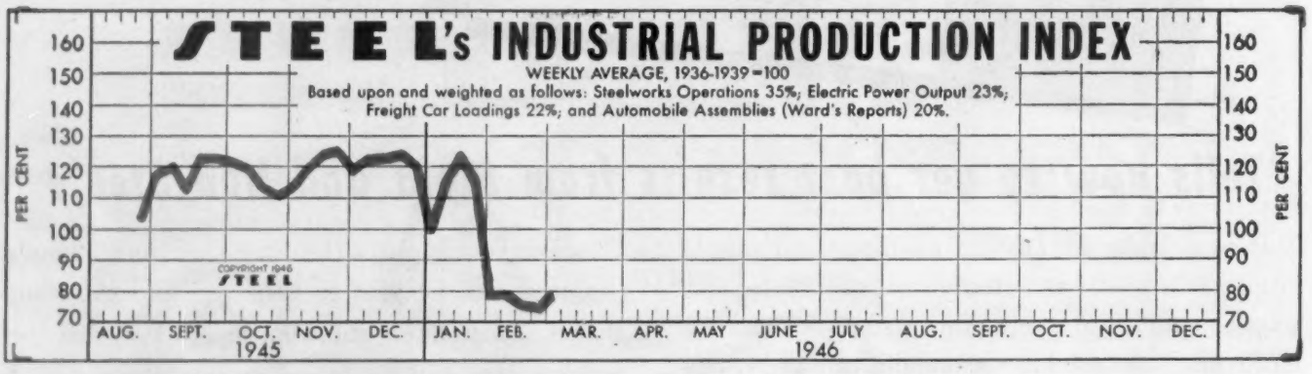
One bright spot currently is the production recovery being made by the steel industry after being strikebound a month. Immediately reflecting the resumption of steelmaking, STEEL's industrial production index in the week ended Feb. 23 rose to 79 per cent (preliminary) from the previous week's 74 per cent, low mark of the steel strike period.

AUTOS—However, the effects of the steel strike were still spreading and reduced automobile production in the week ended Feb. 23 to 19,410 or nearly 10 per cent under the previous week's 21,555. Neither the Ford Motor Co. nor General Motors Corp. produced a car in the week ended Feb. 23, but Chrysler Corp. accounted for 9650 units.

CONSTRUCTION—Only a very slight increase in building permit valuations occurred in January compared with December, probably a result of the discouraging situation with respect to short supply of materials and high prices. The 215 cities reporting regularly to Dun & Bradstreet Inc. issued permits in January totaling $204,052,082, only $43,850 above the December total. However, the January, 1946, total was more than four times the January, 1945, figure of $44,767,043.

MACHINE TOOLS—Estimated shipments of the machine tool industry in January totaled $30,406,000, up 31 per cent over December. Of the January total, 27.4 per cent went to foreign countries. Unfilled orders in January totaled $178,500,000, only $400,000 less than in December. Of the unfilled orders, 27.8 per cent were foreign.

CASTINGS—Shipments of gray iron castings in December totaled 611,872 tons, 8 per cent under November. Unfilled orders on Dec. 31 amounted to 2,526,665, a 3 per cent increase over the backlog at the end of November. Total shipments of steel castings in December dropped to 106,114 tons, lowest of the year. Unfilled orders at the end of December totaled 413,853 tons, compared with 426,766 tons at the end of November. Shipments of malleable iron castings in December declined also. These shipments of 51,963 tons were 9 per cent lower than those in November. Malleable iron castings shipments in 1945 varied from an all-time peak of 85,307 tons in March to a low of 46,960 tons in September. Unfilled orders for malleable iron castings at the end of December totaled 441,534 tons, compared with 433,461 tons at the end of November.



The Index (see chart above): Latest Week (preliminary) 79 Previous Week 74 Month Ago 77

FIGURES THIS WEEK

INDUSTRY	Latest Period**	Prior Week	Month Ago	Year Ago
Steel Ingot Output (per cent of capacity)	16	5.5	5	96
Electric Power Distributed (million kilowatt hours)	3,923	3,949	4,034	4,474
Bituminous Coal Production (daily av.—1000 tons)	2,030	2,073	2,133	1,931
Petroleum Production (daily av.—1000 bbls.)	4,714	4,710	4,626	4,778
Construction Volume (ENR—Unit $1,000,000)	$51.6	$44.1	$101.4	$16.3
Automobile and Truck Output (Ward's—number units)	19,410	21,555	29,410	21,015

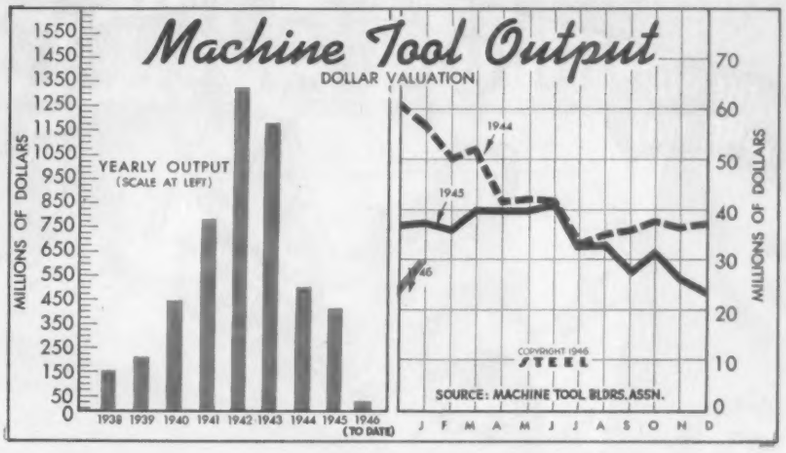
**Dates on request.

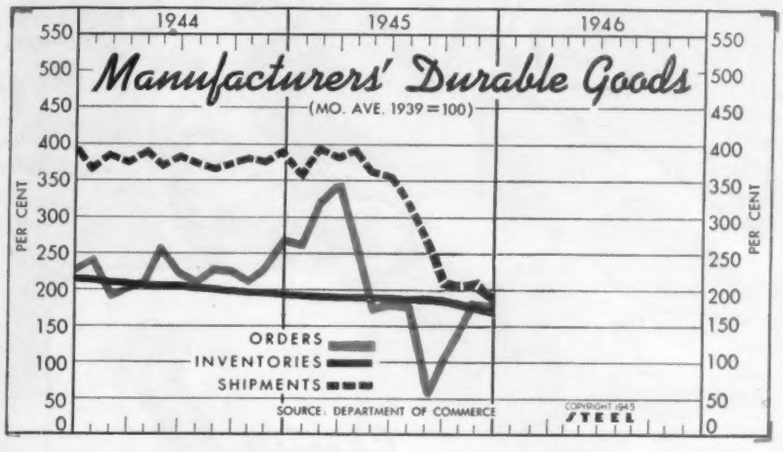
TRADE				
Freight Carloadings (unit—1000 cars)	710†	707	709	772
Business Failures (Dun & Bradstreet, number)	18	25	24	14
Money in Circulation (in millions of dollars)‡	$27,955	$27,967	$27,977	$25,562
Department Store Sales (change from like week a year ago)‡	+19%	+25%	+19%	+24%

†Preliminary. ‡Federal Reserve Board.

Machine Tool Shipments
(000 omitted)

	1946	1945	1944	1943
Jan.	$30,406	$37,353	$56,363	$117,384
Feb.		36,018	50,138	114,594
Mar.		40,045	51,907	125,445
Apr.		40,170	41,370	118,024
May		39,825	41,819	113,859
June		41,040	41,471	108,736
July		32,504	32,753	97,541
Aug.		32,500	35,177	87,805
Sept.		27,300	35,889	85,842
Oct.		31,200	37,516	78,302
Nov.		26,084	36,277	71,811
Dec.		23,276	36,784	60,873
		$407,315	$497,464	$1,180,216



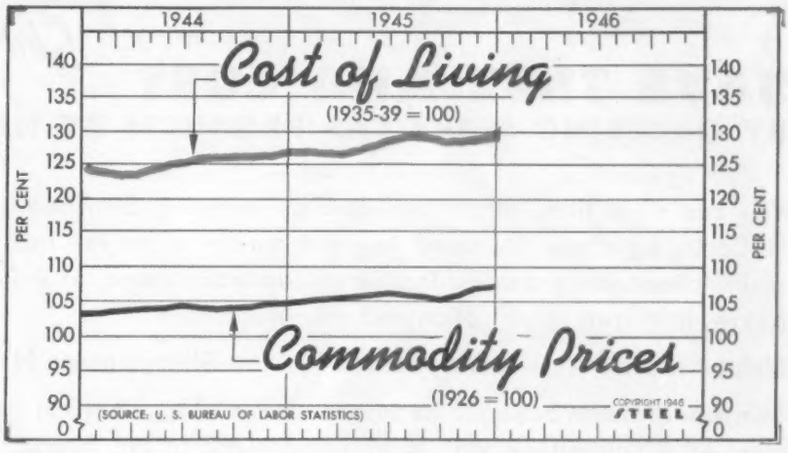


Index of Manufacturers' Durable Goods
(Mo. Ave. 1939 = 100)

	Orders		Shipments		Inventories	
	1945	1944	1945	1944	1945	1944
January	267	248	354	364	190	212
February	326	195	394	384	189	209
March	351	202	382	377	189	207
April	267	215	389	389	189	205
May	177	265	361	371	189	204
June	182	227	356	383	189	204
July	179	213	320	373	187	202
August	54	231	262	366	185	201
September	122	230	216	372	185	199
October	160	214	203	380	182	197
November	171	232	202	374	174	195
December	169	276	192	390	170	192
Average	202	229	303	377	185	202

Wholesale Commodity Price—Cost of Living Indexes

	—Commodities— (1926=100)			—Living Cost— (1935-39=100)		
	1945	1944	1943	1945	1944	1943
Jan.	104.9	103.3	101.9	127.1	124.2	120.6
Feb.	105.2	103.6	102.5	126.9	123.8	120.9
Mar.	105.3	103.8	103.4	126.8	123.8	122.8
Apr.	105.7	103.9	103.7	127.1	124.6	124.1
May	106.0	104.0	104.1	128.1	125.1	125.1
June	106.1	104.3	103.8	129.0	125.4	124.8
July	105.9	104.1	103.2	129.4	126.1	123.8
Aug.	105.7	103.9	103.1	129.3	126.4	123.2
Sept.	105.2	104.0	103.1	128.9	126.5	123.9
Oct.	105.9	104.1	103.0	128.9	126.5	124.4
Nov.	106.8	104.4	102.9	129.3	126.6	124.1
Dec.	107.1	104.7	103.2	129.9	127.0	124.4
Ave.	105.8	104.0	103.2	128.4	125.5	123.5



FINANCE

	Latest Period*	Prior Week	Month Ago	Year Ago
Bank Clearings (Dun & Bradstreet—millions)	$13,250	$10,459	$12,552	$11,756
Federal Gross Debt (billions)	$279.5	$279.5	$278.6	$234.4
Bond Volume, NYSE (millions)	$31.7	$30.3	$35.3	$48.0
Stocks Sales, NYSE (thousands)	7,598	7,581	10,142	7,311
Loans and Investments (billions)†	$67.9	$68.2	$68.2	$58.9
United States Gov't. Obligations Held (millions)†	$49,489	$49,716	$49,629	$43,699

†Member banks, Federal Reserve System.

PRICES

STEEL's composite finished steel price average	$58.27	$58.27	$58.27	$57.55
All Commodities†	107.2	107.1	106.7	105.0
Industrial Raw Materials†	119.7	119.3	118.7	116.2
Manufactured Products†	103.2	103.2	102.9	101.6

†Bureau of Labor Statistics Index, 1926=100.

SAVE TIME AND COST

BY ORDERING FERRY CAP PRODUCTS BY NAME

You can save time, effort and cost by ordering Shinyheads and Hi-Carbs by name. No need to write up the order the long way giving unnecessary details. The Ferry Cap trade name, as indicated below, is its own specification and your guarantee.

Simply specify— **Shinyheads NC** **Shinyheads NF**

Shinyheads mean hexagon head cap screws of high carbon C-1038 steel—full finished—bright, shiny heads—NC or NF thread.

Simply specify— **Hi-Carbs NC** **Hi-Carbs NF**

Hi-Carbs mean hexagon head screws of high carbon C-1038 steel, double heat treated, black satin finish, NC or NF thread.

These Ferry Cap products are carried in stock in popular catalog sizes in bulk and in attractively labeled packages. When ordering from your distributor, simply specify Shinyheads or Hi-Carbs or both.

Simply Specify

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CAP AND SET SCREWS • CONNECTING ROD BOLTS • MAIN BEARING BOLTS • SPRING BOLTS AND SHACKLE BOLTS • HARDENED AND GROUND BOLTS • SPECIAL ALLOY STEEL SCREWS • VALVE TAPPET ADJUSTING SCREWS • AIRCRAFT ENGINE STUDS • ALLOY STEEL AND COMMERCIAL STUDS • FERRY PATENTED ACORN NUTS

MARKET SUMMARY

Steel Output Rise Slowed By Lack of Pig Iron, Scrap

Mills lift operations to 56 per cent . . . Most products sold to year end . . . Tin plate supply below needs . . . Many plants still idle

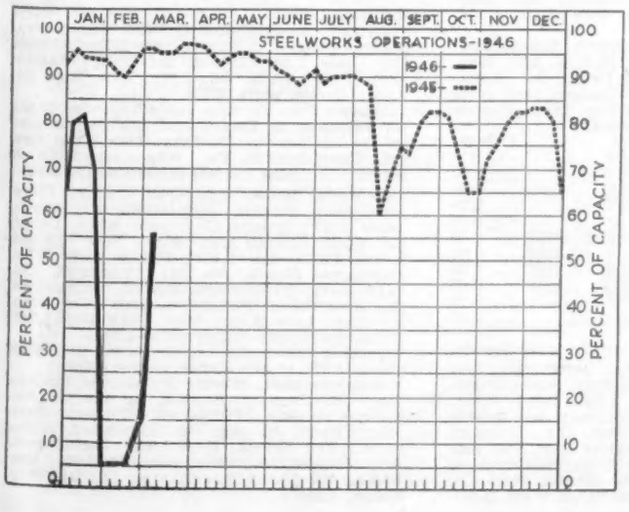
ACCELERATION is noted in demand for steel products and also is strongly evident in pig iron and scrap, especially from steelmakers who find themselves short of material for open hearths.

Steel production still has far to go to reach prestrike levels but another fortnight should bring much further improvement. More steel plants are getting into production and those already in operation are increasing output at an appreciably faster rate. However, some nonintegrated steelmakers were still down last week because of delay in signing labor contracts.

As was the case before the strike, interest is mainly in light flat-rolled products, such as sheets, strip and light-gage plates. However, bars, shapes and tubular goods are especially active and show increasing demand. Most producers still are not in position to make firm delivery promises, with some leading mills refusing to make even tentative commitments. This applies in some instances where order books are full for the remainder of the year and producers do not wish to quote beyond.

In general, sellers of hot and cold-rolled sheets have little available for shipment before November and some are booked solidly for the year. Little, if any, galvanized or electric sheet tonnage can be had this year and stainless sheets have tightened appreciably, in unpolished as well as polished. Some leading producers claim they have nothing in unpolished stainless for shipment before October.

Steelmaking operations are rapidly regaining position lost by the steel strike, the estimated rate for last week being 56 per cent of capacity, a rise of 40 points from the prior week. Every district but one showed a material increase, Cincinnati alone being unchanged at 70 per cent. Pittsburgh gained 54 points to 71.5 per cent. Cleveland rose 60 points to 77 per cent, Youngstown 40 points to 60, Chicago 41 points to 61, Detroit 30 points to 64, Wheeling 23 points to 86, eastern Pennsylvania 23 points to 36, Buffalo 20½ points to 44, Birmingham 45 points to 57, New England 30 points to 75, St. Louis 35 points to 54.



DISTRICT STEEL RATES

(Percentage of Ingot Capacity Engaged in Leading Districts)

	Week Ended March 2	Change	Same Week 1945	Same Week 1944
Pittsburgh	71.5	+54	89.5	93
Chicago	61	+41	98.5	101.5
Eastern Pa.	36	+23	90	94
Youngstown	60	+40	92	94
Wheeling	86	+23	98.5	99.5
Cleveland	77	+60	91	92.5
Buffalo	44	+20.5	90.5	90.5
Birmingham	57	+45	95	95
New England	75	+30	90	89
Cincinnati	70	None	87	92
St. Louis	54	+35	80	74.5
Detroit	64	+30	85	76
Estimated national rate	56	+40	96	97.5

*Based on steelmaking capacities as of these dates.

A major drawback to full steel production is shortage of pig iron, banked blast furnaces being slow to come back to full production. This limits the number of open hearths that can be returned to service. This obstacle is being overcome gradually. Shortage of iron is felt keenly by foundries, especially in view of small supply of cast scrap. During the strike some foundry iron was supplied by stacks normally making steelmaking basic, this supply now being withdrawn as making of basic is resumed. Blowing in of three idle stacks under Civilian Production Administration plans will offer some relief but shortage is expected to continue through much of the year, especially in view of heavy demand for foundry products.

While steel mills used every effort during the shutdown to take all scrap offerings present supply is none too large and melters are seeking all the tonnage they can obtain. Idleness in many fabricating plants has cut supply of industrial scrap to a low point and collections by dealers are much below normal. Some government scrap is coming out but not in volume sufficient to relieve the situation. Railroad offerings also are less than usual, in common with other sources. The tightest squeeze is in cast grades, and some foundries have been forced to close for lack of this material and pig iron.

Tin plate supply for packing perishable food products during the summer has been imperiled by the strike interruption, though tin mills are making good progress toward restoring production. Special attention is being paid to production of tin plate suited to the food pack in preference to other grades.

Average composite prices, based on Office of Price Administration ceilings prior to announcement of new higher prices, are unchanged. Finished steel composite is $58.27, semi-finished steel $37.80, steelmaking pig iron $24.80, steelmaking scrap $19.17. These composites will be subject to revision to reflect the advanced prices soon to be announced, which will be retroactive to Feb. 15.

COMPOSITE MARKET AVERAGES

	Mar. 2	Feb. 23	Feb. 16	One Month Ago Feb. 1946	Three Months Ago Dec. 1945	One Year Ago Mar. 1945	Five Years Ago Mar. 1941
Finished Steel	$58.27	$58.27	$58.27	$58.27	$58.27	$57.55	$56.73
Semifinished Steel	37.80	37.80	37.80	37.80	37.80	36.00	36.00
Steelmaking Pig Iron	24.80	24.80	24.80	24.80	24.25	24.05	23.05
Steelmaking Scrap	19.17	19.17	19.17	19.17	19.17	19.17	20.15

Finished Steel Composite:—Average of industry-wide prices on sheets, strips, bars, plates, shapes, wire nails, tin plate, standard and line pipe. Semifinished Steel Composite:—Average of industry-wide prices on billets, slabs, sheet bars, skelp and wire rods. Steelmaking Pig Iron Composite:—Average of basic pig iron prices at Bethlehem, Birmingham, Buffalo, Chicago, Cleveland, Neville Island, Granite City and Youngstown. Steelworks Scrap Composite:—Average of No. 1 heavy melting steel prices at Pittsburgh, Chicago and eastern Pennsylvania. Finished steel, net tons; others, gross tons.

COMPARISON OF PRICES

Representative Market Figures for Current Week; Average for last Month, Three Months and One Year Ago

Finished Material, cents per lb.; coke, dollars per net ton; others dollars per gross ton.

Finished Material

	Mar. 2, 1946	Feb., 1946	Dec., 1945	Mar., 1945
Steel bars, Pittsburgh	2.25c	2.25c	2.25c	2.15c
Steel bars, Philadelphia	2.57	2.57	2.57	2.47
Steel bars, Chicago	2.25	2.25	2.25	2.15
Shapes, Pittsburgh	2.10	2.10	2.10	2.10
Shapes, Philadelphia	2.215	2.215	2.215	2.215
Shapes, Chicago	2.10	2.10	2.10	2.10
Plates, Pittsburgh	2.25	2.25	2.25	2.20
Plates, Philadelphia	2.30	2.30	2.30	2.25
Plates, Chicago	2.25	2.25	2.25	2.20
Sheets, hot-rolled, Pittsburgh	2.20	2.20	2.20	2.20
Sheets, cold-rolled, Pittsburgh	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Pittsburgh	3.70	3.70	3.70	3.65
Sheets, hot-rolled, Gary	2.20	2.20	2.20	2.20
Sheets, cold-rolled, Gary	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Gary	3.70	3.70	3.70	3.65
Hot-rolled strip, Pittsburgh	2.10	2.10	2.10	2.10
Cold-rolled strip, Pittsburgh	2.80	2.80	2.80	2.80
Bright bess., basic wire, Pittsburgh	2.75	2.75	2.75	2.60
Wire nails, Pittsburgh	2.90	2.90	2.90	2.80
Tin plate, per base box, Pittsburgh	$5.00	$5.00	$5.00	$5.00

Semifinished Material

Sheet bars, Pittsburgh, Chicago	$36.00	$36.00	$36.00	$34.00
Slabs, Pittsburgh, Chicago	36.00	36.00	36.00	34.00
Rerolling billets, Pittsburgh	36.00	36.00	36.00	34.00
Wire rods, No. 5 to $\frac{9}{32}$-inch, Pitts.	2.15	2.15	2.15	2.00

Pig Iron

	Mar. 2, 1946	Feb., 1946	Dec., 1945	Mar., 1945
Bessemer, del. Pittsburgh	$26.94	$26.94	$26.94	$26.19
Basic, Valley	25.25	25.25	25.25	24.50
Basic, eastern del. Philadelphia	27.09	27.09	27.09	26.34
No. 2 fdry., del. Philadelphia	27.59	27.59	27.59	26.84
No. 2 foundry, Chicago	25.75	25.75	25.75	25.00
Southern No. 2, Birmingham	22.13	22.13	22.13	21.38
Southern No. 2 del. Cincinnati	26.05	26.05	26.05	25.30
No. 2 fdry., del. Philadelphia	27.59	27.59	27.59	26.84
Malleable, Valley	25.75	25.75	25.75	25.00
Malleable, Chicago	25.75	25.75	25.75	25.00
Lake Sup., charcoal del. Chicago	37.34	37.34	37.34	37.34
Gray forge, del. Pittsburgh	25.94	25.94	25.94	25.19
Ferromanganese, del. Pittsburgh	140.00	140.00	140.00	140.33

Scrap

Heavy melting steel, No. 1, Pittsburgh	$20.00	$20.00	$20.00	$20.00
Heavy melt. steel, No. 2, E. Pa.	18.75	18.75	18.75	18.75
Heavy melting steel, Chicago	18.75	18.75	18.75	18.75
Rails for rolling, Chicago	22.25	22.25	22.25	22.25
No. 1 cast, Chicago	20.00	20.00	20.00	20.00

Coke

Connellsville, furnace ovens	$7.50	$7.50	$7.50	$7.00
Connellsville, foundry ovens	8.25	8.25	8.25	7.75
Chicago, by-product fdry, del.	13.35	13.75	13.75	13.35

STEEL, IRON, RAW MATERIAL, FUEL AND METALS PRICES

Following are maximum prices established by OPA Schedule No. 6 issued April 16, 1941, revised June 20, 1941, Feb. 4, 1942 and May 21, 1945. The schedule covers all iron or steel ingots, all semifinished iron or steel products, all finished hot-rolled, cold-rolled iron or steel products and any iron or steel product which is further finished by galvanizing, plating, coating, drawing, extruding, etc., although only principal established basing points for selected products are named specifically. Seconds and off-grade products are also covered. Exceptions applying to individual companies are noted in the table. Finished steel quoted in cents per pound.

Semifinished Steel

Gross ton basis except wire rods, skelp.

Carbon Steel Ingots: F.o.b. mill base, rerolling qual., stand. analysis, $31.00.

(Empire Sheet & Tin Plate Co., Mansfield, O. may quote carbon steel ingots at $33 gross ton, f.o.b. mill).

Alloy Steel Ingots: Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon; uncrop, $45.

Rerolling Billets, Blooms, Slabs: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Sparrows Point, Birmingham, Youngstown, $36; Detroit, del. $38; Duluth (bil) $38; Pac. Ports, (bil) $48. (Andrews Steel Co., carbon slabs $41; Continental Steel Corp., billets $34, Kokomo, to Acme Steel Co.; Northwestern Steel & Wire Co., $41, Sterling, Ill.; Laclede Steel Co., $34 Alton or Madison, Ill.; Wheeling Steel Corp. $36 base, billets for lend-lease, $34, Portsmouth, O., on slabs on WPB directives. Granite City Steel Co. $47.50 gross ton slabs from D.P.C. mill. Geneva Steel Co. $58.64, Pac. ports.)

Forging Quality Blooms, Slabs, Billets: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, Youngstown, $42, Detroit, del. $44; Duluth, billets, $44; forg. bil. f.o.b. Pac. ports, $54.

(Andrews Steel Co. may quote carbon forging billets $50 gross ton at established basing points; Follansbee Steel Corp., $49.50 f.o.b. Toronto, O. Geneva Steel Co. $64.64, Pacific ports.)

Open Hearth Shell Steel: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Youngstown, Birmingham, base 1000 tons one size and section; 3-12 in., $52; 12-18 in., excl., $54.00; 18-in. and over $56. Add $2.00 del. Detroit; $3.00 del. Eastern Mich.

Alloy Billets, Slabs, Blooms: Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon, $54, del. Detroit $56, Eastern Mich. $57.

Sheet Bars: Pittsburgh, Chicago, Cleveland, Buffalo, Canton, Sparrows Point, Youngstown, $36. (Wheeling Steel Corp. $37 on lend-lease sheet bars, $38 Portsmouth, O., on WPB directives; Empire Sheet & Tin Plate Co., Mansfield, O., carbon sheet bars, $39, f.o.b. mill.)

Skelp: Pittsburgh, Chicago, Sparrows Point, Youngstown, Coatesville, lb., 1.90c.

Wire Rods: Pittsburgh, Chicago, Cleveland, Birmingham, 5—$\frac{9}{32}$ in. inclusive, per 100 lbs., $2.15 Do., over $\frac{9}{32}$—$\frac{11}{32}$-in., incl., $2.30; Galveston, base, 2.25c and 2.40c respectively. Worcester add $0.10; Pacific ports $0.50 (Pittsburgh Steel Co., $0.05 higher.)

Bars

Hot-Rolled Carbon Bars and Bar-Size Shapes under 3: Pittsburgh, Youngstown, Chicago Gary, Cleveland, Buffalo, Birmingham base 20 tons one size, 2.25c; Duluth, base 2.35c; Detroit, del. 2.35c; Eastern Mich. 2.40c; New York del. 2.59c; Phila. del. 2.57c; Gulf Ports, dock 2.62c; Pac. ports, dock 2.90c, (Calumet Steel Division. Borg-Warner Corp., and Joslyn Mfg. & Supply Co., may quote 2.55c, Chicago base; Sheffield Steel Corp., 2.75c, f.o.b. St. Louis.)

Rail Steel Bars: Same prices as for hot-rolled carbon bars except base is 5 tons.

(Sweet's Steel Co., Williamsport, Pa., may quote rail steel merchant bars 2.33c f.o.b. mill.)

Hot-Rolled Alloy Bars: Pittsburgh, Youngstown, Chicago, Canton, Massillon, Buffalo, Bethlehem base 20 tons one size, 2.70c; Detroit del., 2.80c. (Texas Steel Co. may use Chicago base price as maximum f.o.b. Fort Worth, Tex., price on sales outside Texas, Oklahoma.)

AISI Series	(*Basic O-H)	AISI Series	(*Basic O-H)
1300	$0.10	4300	1.70
2300	1.70	4600	1.20
2500	2.55	4800	2.15
3000	0.50	5100	0.35
3100	0.85	5130 or 5152	0.45
3200	1.35	6120 or 6152	0.95
3400	3.20	6145 or 6150	1.20
4000	0.45-0.55	8612	0.65
4100	(.15-.25 Mo) 0.70	8720	0.70
	(.20-.30 Mo) 0.75	9830	1.30

* Add 0.25 for acid open-hearth; 0.50 electric.

Cold-Finished Carbon Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base 20,000-39,999 lbs., 2.75c; Detroit 2.80c; Toledo 2.90c. (Keystone Drawn Steel Co. may sell outside its usual market area on Proc. Div., Treasury Dept. contracts at 2.65c, Spring City, Pa., plus freight on hot-rolled bars from Pittsburgh to Spring City, New England Drawn Steel Co. may sell outside New England on WPB directives at 2.65c, Mansfield, Mass., plus freight on hot-rolled bars from Buffalo to Mansfield.)

Cold-Finished Alloy Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base 3.35c; Detroit, del. 3.45c; Eastern Mich. 3.50c.

Reinforcing Bars (New Billet): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Sparrows Point, Buffalo, Youngstown, base 2.15c; Detroit del. 2.25c; Eastern Mich. and Toledo 2.30c; Gulf ports, dock 2.50c; Pacific ports, dock 2.55c.

Reinforcing Bars (Rail Steel): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Buffalo base 2.15c; Detroit, del. 2.25c; Eastern Mich. and Toledo 2.30c; Gulf ports, dock 2.50c.

Iron Bars: Single refined, Pitts. 4.40c; double refined 5.40c; Pittsburgh, staybolt, 5.75c; Terre Haute, single ref., 5.00, double ref., 6.25c.

Sheets, Strip

Hot-Rolled Sheets: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Buffalo, Youngstown, Sparrows Pt., Middletown, base 2.20c; Granite City, base 2.30c; Detroit del. 2.30c; Eastern Mich. 2.35c; Phila. del. 2.37c; New York del. 2.44c; Pacific ports 2.75c.

(Andrews Steel Co. may quote hot-rolled sheets for shipment to Detroit and the Detroit area on the Middletown, O., base; Alan Wood Steel Co., Conshohocken, Pa., may quote 2.35c on hot carbon sheets, nearest eastern basing point.)

Cold-Rolled Sheets: Pittsburgh, Chicago, Cleveland, Gary, Buffalo, Youngstown, Middletown, base, 3.05c; Granite City, base 3.15c; Detroit del. 3.15c; Eastern Mich. 3.20c; New York del. 3.39c; Phila. del. 3.37c; Pacific ports 3.70c.

Galvanized Sheets, No. 24: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Youngstown, Sparrows Point, Middletown, base 3.70c; Granite City, base 3.80c; New York del. 3.94c; Phila. del. 3.78c; Pacific ports 4.25c.

(Andrews Steel Co. may quote galvanized sheets 3.75c at established basing points.)

Corrugated Galv. Sheets: Pittsburgh, Chicago, Gary, Birmingham, 29 gage, per square 3.36c.

Culvert Sheets: Pittsburgh, Chicago, Gary, Birmingham, 16 gage not corrugated, copper alloy 3.80c; Granite City 3.90c; Pacific ports 4.25c; copper iron, 3.90c; pure iron 3.95c; zinc-coated, hot-dipped, heat-treated, No. 24, Pittsburgh, 4.25c.

Enameling Sheets: 10-gage; Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, base 2.85c; Granite City, base 2.95c; Detroit, del. 2.95c; eastern, Mich. 3.00c; Pacific ports 3.50c; 20 gage; Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, base 3.45c; Detroit del. 3.55c; eastern Mich. 3.60c; Pacific ports 4.10c.

Electrical Sheets No. 24:

	Pittsburgh Base	Pacific Ports	Granite City
Field grade	3.30c	4.05c	3.40c
Armature	3.65c	4.40c	3.75c
Electrical	4.15c	4.90c	4.25c
Motor	5.05c	5.80c	5.15c
Dynamo	5.75c	6.50c	5.85c
Transformer			
72	6.25c	7.00c	....
65	7.25c	8.00c	....
58	7.75c	8.50c	....
52	8.55c	9.30c	....

Hot-Rolled Strip: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Middletown, base 1 ton and over, 12 inches wide and less 2.10c; Detroit del. 2.20c; Eastern Mich. 2.25c; Pacific ports 2.75c.

Cold Rolled Strip: Pittsburgh, Cleveland, Youngstown, 0.25 carbon and less 2.80c; Chicago, base 2.90c; Detroit, del. 2.90c; Eastern Mich. 2.95c; Worcester base 3.00c.

Commodity C. R. Strip: Pittsburgh, Cleveland, Youngstown, base 3 tons and over, 2.95c; Chicago 3.05c; Detroit del. 3.05c; Eastern Mich. 3.10c; Worcester base 3.35c.

Cold Finished Spring Steel: Pittsburgh, Cleveland bases, add 20c for Worcester; .26-.50 Carb., 2.80c; .51-.75 Carb., 4.30c; .76-1.00 Carb., 6.15c; over 1.00 Carb., 8.35c.

Tin, Terne Plate

Tin Plate: Pittsburgh, Chicago, Gary. 100-lb. base box, $5.00; Granite City, Birmingham, Sparrows Point, $5.10.

Electrolytic Tin Plate: Pittsburgh, Gary, 100-lb. base box, 0.25 lb. tin, $4.35: 0.50 lb tin, $4.50; 0.75 lb. tin $4.65; Granite City, Birmingham, Sparrows Point, $4.45, $4.60, $4.75, respectively.

Tin Mill Black Plate: Pittsburgh, Chicago, Gary, base 29 gage and lighter, 3.05c; Granite City, Birmingham, Sparrows Point, 3.15c; Pacific ports, boxed, 4.05c.

Long Ternes: Pittsburgh, Chicago, Gary, No. 24 unassorted 3.80c; Pacific ports 4.55c.

Manufacturing Ternes: (Special Coated) Pittsburgh, Chicago, Gary, 100-base box $4.30; Granite City, Birmingham, Sparrows Point, $4.40.

Plates

Roofing Ternes: Pittsburgh base per package 112 sheets; 20 x 28 in., coating I. C. 8-lb. $12.00; 15-lb. $14.00; 20-lb. $15.00; 25-lb. $16; 30-lb. $17.25; 40-lb. $19.50.

Carbon Steel Plates: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Sparrows Point, Coatesville, Claymont, 2.25c; New York, del. 2.44c; Phila., del. 2.30c; St. Louis, 2.49c; Boston, del. 2.57-82c; Pacific ports, 2.80c; Gulf ports, 2.60c.
(Granite City Steel Co. may quote carbon plates 2.35c f.o.b. mill; 2.65c f.o.b. D.P.C. mill; Central Iron & Steel Co. 2.50c f.o.b. basing points; Geneva Steel Co., Provo, Utah, 3.20c f.o.b. Pac. ports.)

Floor Plates: Pittsburgh, Chicago, 3.50c; Pacific ports, 4.15c; Gulf ports, 3.85c.

Open-Hearth Alloy Plates: Pittsburgh, Chicago, Coatesville, 3.50c; Gulf ports 3.95c; Pacific ports 4.15c.

Shapes

Structural Shapes: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Bethlehem, 2.10c; New York, del. 2.27c; Phila., del. 2.215c; Pacific ports. 2.75c; Gulf ports, 2.45c.
(Phoenix Iron Co., Phoenixville, Pa., may quote the equivalent of 2.45c, Bethlehem, Pa., on the general range and 2.55c on beams and channels from 4 to 10 inches.)

Steel Piling: Pittsburgh, Chicago, Buffalo, 2.40c; Pacific ports, 2.95c.

Wire Products, Nails

Wire: Pittsburgh, Chicago, Cleveland, Birmingham to manufacturers in carloads.

Bright, basic, bessemer wire	•$2.75
Spring wire	•†$3.35

Wire Products to the Trade:

Standard and cement-coated wire nails, and staples, 100-lb. keg, Pittsburgh, Chicago, Birmingham, Cleveland, $2.90; Worcester, $3.20; Pac. ports, $3.40; galvanized, $2.55 and $3.05, resp.

Annealed Merchant quality wire, 100-lb., Pittsburgh, Chicago, Cleveland, Birmingham ..... ††$3.20

Galvanized Merchant quality wire, 100-lb., Pittsburgh, Chicago, Cleveland, Birmingham ..... ††$3.55

Woven fence, 15½ gage and heavier, per base column 67

Barbed wire, 80-rod spool, Pittsburgh, Chicago, Cleveland, Birmingham, column 72; twisted barbless wire, column 72.

•Add $0.10 for Worcester, $0.05 for Duluth; add $0.50 for bright, annealed, galvanized and $0.70 for other finishes for Pacific ports.

ADJUSTMENTS PEND

Under Office of Stabilization Administration directive, dated Feb. 15, 1946, steelmakers are permitted to deliver carbon and alloy steel products at existing maximum prices, such prices to be subject to later upward revision following determination of specific product prices by the Office of Price Administration, determined upon in applying the adjustable $5 per ton price increase allowed by the OSA as of Feb. 15. Prices quoted on these pages are subject to revision in accordance with specific product price determinations by OPA.

†Same bases as for bright basic except Birmingham.

††Add 10 cents for Worcester; 50 cents for annealed, bright basic and 70 cents for all other finishes for Pacific ports.

Tubular Goods

Welded Pipe: Base price in carloads, threaded and coupled to consumers about $200 per net ton. Base discounts on steel pipe Pittsburgh and Lorain, O.; Gary, Ind. 2 points less on lap weld, 1 point less on butt weld. Pittsburgh base only on wrought iron pipe.

Butt Weld

Steel In.	Blk.	Galv.	Iron In.	Blk.	Galv.
⅛	56	33	½	24	3½
¼ & ⅜	59	40½	¾	30	10
½	63½	51	1-1¼	34	16
¾	66½	55	1½	38	18½
1-3	68½	57½	2	37½	18

Lap Weld

Steel In.	Blk.	Galv.	Iron In.	Blk.	Galv.
2	61	49½	1¼	23	3½
2½-3	64	54½	1½	28½	10
3½-6	66	54½	2	30½	12
7-8	65	52½	2½-3½	31½	14½
9-10	64½	52	4	33½	18
11-12	63½	51	4½-8	32½	17
			9-12	28½	12

Boiler Tubes: Net base prices per 100 feet f.o.b. Pittsburgh in carload lots, minimum wall, cut lengths 4 to 24 feet, inclusive.

O.D. sizes	B.W.G.	—Seamless— Hot Rolled	Cold Drawn	—Lap Weld— Steel	Charcoal Iron
1"	13	.....	$ 9.01	.....	.....
1¼"	13	.....	10.67	.....	.....
1½"	13	$10.23	11.72	$ 9.72	23.71
1¾"	13	11.64	13.42	11.06	22.93
2"	13	13.04	15.03	12.38	19.35
2¼"	13	14.54	16.76	13.79	21.63
2¼"	12	16.01	18.45	15.16	.....
2½"	12	17.54	20.21	16.58	26.57
2¾"	12	18.59	21.42	17.54	29.00
3"	12	19.50	22.48	18.35	31.38
3½"	11	24.63	28.37	23.15	39.81
4"	10	30.54	35.20	28.66	49.90
4½"	10	37.35	43.04	35.22	.....
5"	9	46.87	54.01	44.25	73.93
6"	7	71.96	82.93	68.14	.....

Rails, Supplies

Standard rails, over 60-lb., f.o.b. mill, gross ton, $43.00. Light rails (billet), Pittsburgh, Chicago, Birmingham, gross ton, $45.00.

•Relaying rails, 35 lbs. and over, f.o.b. railroad and basing points, $31-$33.

Supplies: Track bolts, 4.75c; heat treated. 5.00c. Tie plates $46 net ton, base, Standard spikes, 3.25c.

•Fixed by OPA Schedule No. 46, Dec. 15, 1941.

Tool Steels

Tool Steels: Pittsburgh, Bethlehem, Syracuse, Canton, O., Dunkirk, N. Y., base, cents per lb.; Reg. carbon 14.00c; extra carbon 18.00c; special carbon 22.00c; oil-hardening 24.00c; high car.-chr. 43.00c

Tung	Chr.	Van.	Moly.	Base, per lb.
18.00	4	1	...	67.00c
1.5	4	1	8.5	54.00c
.....	4	2	3	54.00c
6.40	4.15	1.90	5	57.50c
5.50	4.50	4	4.50	70.00c

Rivets, Washers

F.o.b. Pittsburgh, Cleveland, Chicago Birmingham

Structural	3.75c
⅞-inch and under	65.-5 off
Wrought, Washers, Pittsburgh, Chicago, Philadelphia, to jobbers and large nut, bolt manufacturers l.c.l.	$2.75.-3.00 off

Bolts, Nuts

F.o.b. Pittsburgh, Cleveland, Birmingham, Chicago. Discounts for carloads additional 5%, full containers, add 10%

Carriage and Machine

½ x 6 and smaller	63½ off
Do., ⅞ and ⅝ x 6-in. and shorter	63½ off
Do., ¾ to 1 x 6-in. and shorter	61 off
1⅛ and larger, all lengths	59 off
All diameters, over 6-in. long	59 off
Tire bolts	50 off
Step bolts	56 off
Plow bolts	65 off

Stove Bolts

In packages with nuts separate 71-10 off; bulk 80 off on 15,000 of 3-inch and shorter, or 5000 over 3-in.

Nuts

Semifinished hex	U.S.S.	S.A.E.
⅞-inch and less	62	64
½-1-inch	59	60
1⅛-1½-inch	57	58
1⅝ and larger	56	..

Hexagon Cap Screws

Upset 1-in., smaller	64 off
Milled 1-in., smaller	60 off

Square Head Set Screws

Upset, 1-in., smaller	71 off
Headless, ¼-in., larger	60 off
No. 10 smaller	70 off

Stainless Steels

Base, Cents per lb.

Type	Bars	Plates	Sheets	H. R. Strip	C. R. Strip
CHROMIUM NICKEL STEEL					
302	24.00c	27.00c	34.00c	21.50c	28.00c
303	26.00	29.00	36.00	27.00	33.00
304	25.00	29.00	36.00	23.50	30.00
308	29.00	34.00	41.00	28.50	35.00
309	36.00	40.00	47.00	37.00	47.00
310	49.00	52.00	53.00	48.75	56.00
312	36.00	40.00	49.00	.....	.....
•316	40.00	44.00	48.00	40.00	48.00
‡321	29.00	34.00	41.00	29.25	38.00
‡347	33.00	38.00	45.00	33.00	42.00
431	19.00	22.00	29.00	17.50	22.50
STRAIGHT CHROMIUM STEEL					
403	21.50	24.50	29.50	21.25	27.00
**410	18.50	21.50	26.50	17.60	22.00
416	19.00	22.00	27.00	18.25	23.50
††420	24.00	28.50	33.50	23.75	30.50
430	19.00	22.00	29.00	17.50	22.50
††430F	19.50	22.50	29.50	18.75	24.50
440A	24.00	28.50	33.50	23.75	30.50
442	22.50	25.50	32.50	24.00	32.00
443	22.50	25.50	32.50	24.00	32.00
446	27.50	30.50	36.50	35.00	52.00
501	8.00	12.00	15.75	12.00	17.00
502	9.00	13.00	16.75	13.00	18.00
STAINLESS CLAD STEEL (20%)					
304	‡‡18.00	19.00	.....	.....	

•With 2-3% moly. ‡With titanium. ‡With columbium. **Plus machining agent. ††High carbon. ‡‡Free machining. §§Includes annealing and pickling.

Metallurgical Coke

Price Per Net Ton

Beehive Ovens

Connellsville, furnace	•7.50
Connellsville, foundry	8.00- 8.50
New River, foundry	9.00- 9.25
Wise county, foundry	7.75- 8.25
Wise county, furnace	7.25- 7.75

By-Product Foundry

Kearney, N. J., ovens	13.05
Chicago, outside delivered	13.00
Chicago, delivered	13.75
Terre Haute, delivered	13.50
Milwaukee, ovens	13.75
New England, delivered	14.65
St. Louis, delivered	†18.75
Birmingham, delivered	10.90
Indianapolis, delivered	13.50
Cincinnati, delivered	13.25
Cleveland, delivered	13.20
Buffalo, delivered	13.40
Detroit, delivered	13.75
Philadelphia, delivered	13.28

•Operators of hand-drawn ovens using trucked coal may charge $8.00; effective May 26, 1945.
†14.25 from other than Ala., Mo., Tenn.

Coke By-Products

Spot, gal., freight allowed east of Omaha	
Pure and 90% benzol	15.00c
Toluol, two degree	27.00c
Solvent naphtha	26.00c
Industrial xylol	26.00c
Per lb. f.o.b. works	
Phenol (car lots, returnable drums)	10.50c
Do., less than car lots	11.25c
Do., tank cars	9.50c
Eastern Plants, per lb.	
Naphthalene flakes, balls, bbls., to jobbers	8.00c
Per ton, bulk, f.o.b. port	
Sulphate of ammonia	$29.20

WAREHOUSE STEEL PRICES

Base delivered price, cents per pound, for delivery within switching limits, subject to established extras.

	Hot rolled bars	Structural shapes	Plates	Floor plates	Hot rolled sheets (10 gage base)	Hot rolled bands (12 gage and heavier)	Hot rolled hoops (14 gage and lighter)	Galvanized flat sheets (24 gage base)	Cold-rolled sheets (17 gage base)	Cold finished bars	Cold-rolled strip	NE hot bars 8600 series	NE hot bars 9400 series
Boston	4.044[1]	3.912[1]	3.912[1]	5.727[1]	3.774[1]	4.106[1]	5.106[1]	5.224[14]	4.744[14]	4.244[11]	4.715	6.012[23]	6.012[23]
New York	3.853[1]	3.758[1]	3.768[1]	5.574[1]	3.590[1]	3.974[1]	3.974[1]	5.010[13]	4.613[14]	4.203[21]	4.774	.....	.....
Jersey City	3.853[1]	3.747[1]	3.768[1]	5.574[1]	3.590[1]	3.974[1]	3.974[1]	5.010[13]	4.613[14]	4.203[21]	4.774	.....	.....
Philadelphia	3.823[1]	3.666[1]	3.605[1]	5.272[1]	3.518[1]	3.922[1]	4.272[1]	5.018[15]	4.872[25]	4.172[21]	4.772	5.816[23]	5.860[23]
Baltimore	3.802[1]	3.759[1]	3.594[1]	5.252[1]	3.394[1]	3.902[1]	4.252[1]	4.894[1]	4.852[25]	4.152[21]	.....	.....	.....
Washington	3.941[1]	3.930[1]	3.796[1]	5.341[1]	3.596[1]	4.041[1]	4.391[1]	5.196[17]	4.841[20]	4.141[21]	.....	.....	.....
Norfolk, Va.	4.065[1]	4.002[1]	3.971[1]	5.465[1]	3.771[1]	4.165[1]	4.515[1]	5.371[17]	4.965[24]	4.265[21]	.....	.....	.....
Bethlehem, Pa.*	.....	3.45[1]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Claymont, Del.*	.....	.....	3.45[1]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Coatesville, Pa.*	.....	.....	3.45[1]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Buffalo (city)	3.35[1]	3.40[1]	3.63[1]	5.26[1]	3.35[1]	3.819[1]	3.819[1]	4.75[13]	4.40[10]	3.85[21]	4.669	5.60[23]	5.75[23]
Buffalo (country)	3.25[1]	3.30[1]	3.30[1]	4.90[1]	3.25[1]	3.81[1]	3.50[1]	4.65[15]	4.30[10]	3.75[21]	4.35	5.60[23]	5.75[23]
Pittsburgh (city)	3.35[1]	3.40[1]	3.40[1]	5.00[1]	3.35[1]	3.60[1]	3.60[1]	4.75[13]	4.40[24]	3.85[21]	.....	.....	.....
Pittsburgh (country)	3.25[1]	3.30[1]	3.30[1]	4.90[1]	3.25[1]	3.50[1]	3.50[1]	4.65[13]	4.30[24]	3.75[21]	.....	.....	.....
Cleveland (city)	3.35[1]	3.588[1]	3.40[1]	5.168[1]	3.35[1]	3.60[1]	3.60[1]	4.877[13]	4.40[24]	3.85[21]	4.45[21]	5.60[23]	5.65[23]
Cleveland (country)	3.25[1]	.....	3.30[1]	.....	3.25[1]	3.50[1]	3.50[1]	.....	4.30[24]	3.75[21]	4.35[21]	.....	.....
Detroit	3.450[1]	3.661[1]	3.609[1]	5.281[1]	3.450[1]	3.700[1]	3.700[1]	5.000[12]	4.500[24]	3.900[21]	4.659	5.93[23]	5.93[23]
Omaha (city, delivered)	4.043[1]	4.093[1]	4.093[1]	5.693[1]	3.793[1]	4.143[1]	4.143[1]	5.615[13]	5.443[24]	4.543[12]	.....	.....	.....
Omaha (country, base)	3.943[1]	3.993[1]	3.993[1]	5.593[1]	3.693[1]	4.043[1]	4.043[1]	5.515[13]	.....	.....	.....	.....	.....
Cincinnati	3.611[1]	3.691[1]	3.661[1]	5.291[1]	3.425[1]	3.675[1]	3.675[1]	4.825[13]	4.475[24]	4.111[21]	4.711	6.10	6.20
Youngstown, O.*	.....	.....	.....	.....	.....	.....	.....	4.40[13]	.....	.....	.....	.....	.....
Middletown, O.*	.....	.....	.....	.....	3.25[1]	3.50[1]	3.50[1]	4.65[13]	.....	.....	.....	.....	.....
Chicago (city)	3.50[1]	3.55[1]	3.55[1]	5.15[1]	3.25[1]	3.60[1]	3.60[1]	5.231[15]	4.20[24]	3.85[21]	4.65	5.75[23]	5.85[23]
Milwaukee	3.637[1]	3.687[1]	3.687[1]	5.287[1]	3.387[1]	3.737[1]	3.737[1]	5.272[15]	4.337[24]	3.987[21]	4.787	5.987[23]	6.087[23]
Indianapolis	3.58[1]	3.63[1]	3.63[1]	5.23[1]	3.518[1]	3.768[1]	3.768[1]	4.918[15]	4.568[24]	4.08[21]	4.78	6.08[23]	6.18[23]
St. Paul	3.76[3]	3.81[3]	3.81[3]	5.41[3]	3.51[3]	3.86[3]	3.86[3]	5.257[15]	4.46[24]	4.461[21]	5.102	6.09[23]	6.19[23]
St. Louis	3.647[1]	3.697[1]	3.697[1]	5.297[1]	3.397[1]	3.747[1]	3.747[21]	5.172[15]	4.347[24]	4.131[21]	4.931	6.131[23]	6.281[23]
Memphis, Tenn.	4.015[1]	4.065[1]	4.065[1]	5.78[1]	3.965[1]	4.215[1]	4.215[1]	5.265[15]	4.78[24]	4.43[21]	.....	.....	.....
Birmingham	3.50[1]	3.55[1]	3.55[1]	5.903[1]	3.45[1]	3.70[1]	3.70[1]	4.75[16]	4.852[24]	4.64	5.215	.....	.....
New Orleans (city)	4.10[4]	3.90[4]	3.90[4]	5.85[4]	4.058[4]	4.20[4]	4.20[4]	5.25[26]	5.079[10]	4.70[21]	5.429	.....	.....
Houston, Tex.	3.75[3]	4.25[1]	4.25[1]	5.50[9]	3.763[3]	4.313[9]	4.313[3]	5.313[26]	5.594[10]	3.75[23]	.....	.....	.....
Los Angeles	4.40[4]	4.65[4]	4.95[4]	7.20[4]	5.00[4]	4.95[4]	6.75[4]	6.00[12]	7.20[6]	5.683[23]	5.613	5.85[23]	5.95[23]
San Francisco	4.15[7]	4.35[7]	4.65[7]	6.35[7]	4.55[7]	4.50[7]	5.75[7]	6.35[18]	7.30[18]	5.433[21]	7.333	8.304[23]	8.404[23]
Portland, Oreg.	4.45[27]	4.45[27]	4.75[27]	6.50[27]	4.65[27]	4.75[27]	6.30[27]	5.75[15]	6.60[15]	5.633[15]	.....	.....	.....
Tacoma	4.35[6]	4.45[6]	4.75[6]	6.50[6]	4.65[6]	4.25[6]	5.45[6]	5.95[15]	7.60[15]	5.883[21]	.....	.....	8.00[23]
Seattle	4.35[8]	4.45[6]	4.75[8]	6.50[8]	4.65[8]	4.25[8]	5.45[8]	5.95[15]	7.05[15]	5.883[21]	.....	.....	8.00[23]

*Basing point cities with quotations representing mill prices, plus ware house spread.

NOTE—All prices fixed by Office of Price Administration in Amendments Nos. 10 to 33 to Revised Price Schedule No. 49. Deliveries outside above cities computed in accordance with regulations.

BASE QUANTITIES

[1]—400 to 1999 pounds; [2]—400 to 14,999 pounds; [3]—any quantity; [4]—300 to 1999 pounds; [5]—400 to 8999 pounds; [6]—300 to 9999 pounds; [7]—400 to 39,999 pounds; [8]—under 2000 pounds; [9]—under 4000 pounds; [10]—500 to 1499 pounds; [11]—one bundle to 39,999 pounds; [12]—150 to 2249 pounds; [13]—150 to 1499 pounds; [14]—three to 24 bundles; [15]—450 to 1499 pounds; [16]—one bundle to 1499 pounds; [17]—one to nine bundles; [18]—one to six bundles; [19]—100 to 749 pounds; [20]—300 to 1999 pounds; [21]—1500 to 39,999 pounds; [22]—1500 to 1999 pounds; [23]—1000 to 39,999 pounds; [24]—400 to 1499 pounds; [25]—1000 to 1999 pounds; [26]—under 25 bundles. Cold-rolled strip, 2000 to 39,999 pounds, base; [27]—300 to 4999 pounds.

Ores

Lake Superior Iron Ore

Gross ton, 51½% (Natural) Lower Lake Ports

Old range bessemer	$4.95
Mesabi nonbessemer	4.55
High phosphorus	4.35
Mesabi bessemer	4.70
Old range nonbessemer	4.80

Eastern Local Ore

Cents, units, del. E. Pa.

Foundry and basic 56-63% contract	18.00

Foreign Ore

Cents per unit, c.i.f. Atlantic ports

Manganiferous ore, 45-55% Fe., 6-10% Mang.	Nom.
N. African low phos.	Nom.
Swedish basic, 60 to 68%	Nom.
Spanish, No. African basic, 50 to 60%	Nom.
Brazil iron ore, 68-69% f.o.b. Rio de Janeiro	7.50-8.00

Tungsten Ore

Chinese Wolframite, per short ton unit, duty paid	$24.00

Chrome Ore

(Equivalent OPA schedules):

Gross ton f.o.b. cars, New York, Philadelphia, Baltimore, Charleston, S. C., Portland, Ore., or Tacoma, Wash. (S S paying for discharge; dry basis, subject to penalties if guarantees are not net.)

Indian and African

48% 2.8:1	$39.75
48% 3:1	41.00
48% no ratio	31.00

South African (Transvaal)

44% no ratio	$27.40
45% no ratio	28.30
48% no ratio	31.00
50% no ratio	32.80

Brazilian—nominal

44% 2.5:1 lump	33.65
48% 3:1 lump	43.50

Rhodesian

45% no ratio	28.30
48% no ratio	31.00
48% 3:1 lump	41.00

Domestic (seller's nearest rail)

48% 3:1	52.80

less $7 freight allowance.

Manganese Ore

Sales prices of Metals Reserve Co., cents per gross ton unit, dry, 48%, at New York, Philadelphia, Baltimore, Norfolk, Mobile and New Orleans, 85.0c; Fontana, Calif., Provo, Utah, and Pueblo, Colo., 91.0c; prices include duty on imported ore and are subject to premiums, penalties and other provisions of amended M.P.R. No. 248, effective as of May 15. Price at basing points which are also points of discharge of imported manganese ore is f.o.b. cars, shipside, at dock most favorable to the buyer. Outside shipments direct to consumers at 10c per unit less than Metal Reserve Co. prices.

Molybdenum

Sulphide conc., lb., Mo. cont., mines	$0.75

NATIONAL EMERGENCY STEELS (Hot Rolled)

(Extras for alloy content)

Designation	Chemical Composition Limits, Per Cent — Carbon	Mn.	Si.	Cr.	Ni.	Mo.	Basic open-hearth Electric furnace: Bars per 100 lb.	Billets per GT	Bars per 100 lb.	Billets per GT
NE 9415	.13-.18	.80-1.10	.20-.35	.30-.50	.30-.60	.08-.15	$0.75	$15.00	$1.25	$25.00
NE 9425	.23-.28	.80-1.20	.20-.35	.30-.50	.30-.60	.08-.15	.75	15.00	1.25	25.00
NE 9442	.40-.45	1.00-1.30	.20-.35	.30-.50	.30-.60	.08-.15	.80	16.00	1.30	26.00
NE 9722	.20-.25	.50-.80	.20-.35	.10-.25	.40-.70	.15-.25	.65	13.00	1.15	23.00
NE 9912	.10-.15	.50-.70	.20-.35	.40-.60	1.00-1.30	.20-.30	1.20	24.00	1.55	31.00
NE 9920	.18-.23	.50-.70	.20-.35	.40-.60	1.00-1.30	.20-.30	1.20	24.00	1.55	31.00

Extras are in addition to a base price of 2.70c, per pound on finished products and $54 per gross ton on semifinished steel major basing points and are in cents per pound and dollars per gross ton. No prices quoted on vanadium alloy.

Pig Iron

Prices (in gross tons) are maximum fixed by OPA Price Schedule No. 10, effective June 10, 1941, amended Feb. 14, and Oct. 22, 1945. Exceptions indicated in footnotes. Base prices bold face, delivered light face. Federal tax on freight charges, effective Dec. 1, 1942, not included.

	Foundry	Basic	Bessemer	leable Mal-
Bethlehem, Pa., base	$26.75	$26.25	$27.75	$27.25
Newark, N. J., del.	28.28	27.78	29.28	28.78
Brooklyn, N. Y., del.	29.25	.....	.....	29.75
Birdsboro, Pa., base	26.75	26.25	27.75	27.25
Birmingham, base	22.13	20.75	26.75	.....
Baltimore, del.	27.36	.....	.....	.....
Boston, del.	26.89	.....	.....	.....
Chicago, del.	25.97	.....	.....	.....
Cincinnati, del.	25.81	24.48	.....	.....
Cleveland, del.	25.87	24.99	.....	.....
Newark, N. J.	27.90	.....	.....	.....
Philadelphia, del.	27.21	26.71	.....	.....
St. Louis, del.	25.87	24.99	.....	.....
Buffalo, base	25.75	24.75	26.75	26.25
Boston, del.	27.25	26.75	28.25	27.75
Rochester, del.	27.28	.....	28.28	27.78
Syracuse, del.	27.83	.....	28.83	28.33
Chicago, base	25.75	25.25	26.25	25.75
Milwaukee, del.	26.85	26.35	27.35	26.85
Muskegon, Mich., del.	28.94	.....	.....	28.94
Cleveland, base	25.75	25.25	26.25	25.75
Akron, Canton, del.	27.14	26.64	27.64	27.14
Detroit, base	25.75	25.25	26.25	25.75
Saginaw, Mich., del.	28.06	27.56	28.56	28.06
Duluth, base	26.25	25.75	26.75	26.25
St. Paul, del.	28.38	27.88	28.88	28.38
Erie, Pa., base	25.75	25.25	26.75	26.25
Everett, Mass., base	26.75	26.25	27.75	27.25
Boston, del.	27.25	26.75	28.25	27.75
Granite City, Ill., base	25.75	25.25	26.25	25.75
St. Louis, del.	26.25	25.75	.....	26.25
Hamilton, O., base	25.75	25.25	.....	25.75
Cincinnati, del.	26.19	26.36	.....	26.86
Neville Island, Pa., base	25.75	25.25	26.25	25.75
§Pittsburgh, del. No. & So. sides	26.44	25.94	26.94	26.44
Provo, Utah, base	23.75	23.25	.....	.....
Sharpsville, Pa., base	25.75	25.25	26.25	25.75
Sparrows Point, base	26.75	26.25	.....	.....
Baltimore, del.	27.74	.....	.....	.....
Steelton, Pa., base	.....	26.25	.....	.....
Swedeland, Pa., base	26.75	26.25	27.75	27.25
Philadelphia, del.	27.59	27.09	.....	28.09
Toledo, O., base	25.75	25.25	26.25	25.75
Youngstown, O., base	25.75	25.25	26.25	25.75
Mansfield, O., del.	27.69	27.19	28.19	27.69

Base grade, silicon 1.75-2.25%; add 50 cents for each additional 0.25% silicon, or portion thereof; deduct 50 cents for silicon below 1.75% on foundry iron. §For McKees Rocks, Pa., add .55 to Neville Island base; Lawrenceville, Homestead, McKeesport, Ambridge, Monaco, Aliquippa, .84; Monessen, Monongahela City .97 (water); Oakmont, Verona 1.11; Brackenbridge 1.24

Note: Add 50 cents per ton for each 0.50% manganese or portion thereof over 1.00%.

Nickel differentials: Under 0.50%, no extra; 0.50% to 0.74% incl., $2 per ton; for each additional 0.25% nickel, $1 per ton.

High Silicon, Silvery

6.00-6.50 per cent (base) $31.25

6.51-7.00	$32.25	9.01- 9.50	37.25
7.01-7.50	33.25	9.51-10.00	38.25
7.51-8.00	34.25	10.01-10.50	39.25
8.01-8.50	35.25	10.51-11.00	40.25
8.51-9.00	36.25	11.01-11.50	41.25

F.o.b. Jackson county, O., per gross ton. Buffalo base $1.25 higher, whichever is most favorable to buyer. Prices subject to additional charge of 50 cents a ton for each 0.50% manganese in excess of 1.00%.

Electric Furnace Ferrosilicon: Sil. 14.01 to 14.50%, $45.50 Jackson Co.; each additional .50% silicon up to and including 18% add $1; low impurities not exceeding 0.005 Phos., 0.40 Sulphur, 1.0% Carbon, add $1.

Bessemer Ferrosilicon

Prices same as for high silicon silvery iron, plus $1 per gross ton.

Charcoal Pig Iron

Northern

Lake Superior Furn. $34.00
Chicago, del. 37.34

Southern

Semi-cold blast, low phos., f.o.b. furnace, Lyles, Tenn. $33.00 (For higher silicon irons a differential over and above the price of base grade is charged as well as for the hard chilling iron, Nos. 5 and 6.)

Gray Forge

Neville Island, Pa. $25.25
Valley base 25.25

Low Phosphorus

Basing points: Birdsboro, Pa., Steelton, Pa., and Buffalo, N. Y., $31.25 base; $32.49, del. Philadelphia. Intermediate phos., Central Furnace, Cleveland, $28.25.

Switching Charges: Basing Point prices are subject to an additional charge for delivery within the switching limits of the respective districts.

Silicon Differential: Basing point prices are subject to an additional charge not to exceed 50 cents a ton for each 0.25 silicon in excess of base grade (1.75 to 2.25%).

Phosphorus Differential: Basing point prices are subject to a reduction of 38 cents a ton for phosphorus content of 0.70% and over.

Ceiling Prices are the aggregate of (1) governing basing point (2) differentials (3) transportation charges from governing basing point to point of delivery as customarily computed. Governing basing point is the one resulting in the lowest delivered price for the consumer.

Exceptions to Ceiling Prices: Struthers Iron & Steel Co. may charge 50 cents a ton in excess of basing point prices for No. 2 Foundry, Basic, Bessemer and Malleable. Mystic Iron Works, Everett, Mass., may exceed basing point prices by $1 per ton.

Refractories

Per 1000 f.o.b. Works, Net Prices

Fire Clay Brick

Super Duty

Pa., Mo., Ky. $68.50

First Quality

Pa., Ill., Md., Mo., Ky.	54.40
Alabama, Georgia	54.40
New Jersey	59.35
Ohio	47.70

Second Quality

Pa., Ill., Md., Mo., Ky.	49.35
Alabama, Georgia	40.30
New Jersey	52.00
Ohio	38.15

Malleable Bung Brick

All bases 63.45

Silica Brick

Pennsylvania	54.40
Joliet, E. Chicago	62.45
Birmingham, Ala.	54.40

Ladle Brick

(Pa., O., W. Va., Mo.)

Dry Press	32.90
Wire Cut	30.80

Magnesite

Domestic dead-burned grains, net ton f.o.b. Chewelah, Wash., net ton, bulk 22.00
net ton, bags 26.00

Basic Brick

net ton, f.o.b. Baltimore, Plymouth Meeting, Chester, Pa.

Chrome brick	54.00
Chem. bonded chrome	54.00
Magnesite brick	76.00
Chem. bonded Magnesite	65.00

Fluorspar

Metallurgical grade, f.o.b. Ill., Ky., net tons, carloads, CaF_2 content, 70% or more, $33; 65 but less than 70%, $32; 60 but less than 65% $31; less than 60%, $30. After Aug. 29 base price any grade $30.00 war chemicals.

Ferroalloy Prices

Ferromanganese (standard) 78-82% c.l. gross ton, duty paid, $135 f.o.b. cars, Baltimore, Philadelphia or New York, whichever is most favorable to buyer; Rockdale or Rockwood, Tenn.; where Tennessee Products Co. is producer; Birmingham, Ala., where Sloss-Sheffield Steel & Iron Co. is producer; $140 f.o.b. cars, Pittsburgh, where Carnegie-Illinois Steel Corp. is producer; add $6 for packed c.l., $10 for ton, $13.50 for less ton; $1.70 for each 1%, or fraction contained manganese over 82% or under 78%.

Ferromanganese (Low and Medium Carbon); per lb. contained manganese; eastern zone, low carbon, bulk, c.l., 23c; 2000 lb. to c.l., 23.40c; medium, 14.50c and 15.20c; central, low carbon, bulk, c.l., 23.30c; 2000 lb. to c.l., 24.40c; medium 14.80c and 16.20c; western, low carbon, bulk, c.l., 24.50c, 2000 lb. to c.l., 25.40c; medium, 15.75c and 17.20c; f.o.b. shipping point, freight allowed.

Spiegeleisen: 19-21% carlots per gross ton, Palmerton, Pa., $36; Pittsburgh, $40.50; Chicago, $40.60.

Electrolytic Manganese: 99.9% plus, less ton lots, per lb. 37.6 cents.

Chromium Metal: 97% min. chromium, max. .50% carbon, eastern zone, per lb. contained chromium bulk, c.l., 79.50c, 2000 lb. to c.l. 80c; central 81c and 82.50c; western 82.25c and 84.75c; f.o.b. shipping point, freight allowed.

Ferrocolumbium: 50-60%, per lb. contained columbium in gross ton lots, contract basis, R. R. freight allowed, eastern zone, $2.25; less-ton lots $2.30. Spot prices 10 cents per lb. higher.

Ferrochrome: High carbon, eastern zone, bulk, c.l., 13c, 2000 lb. to c.l. 13.90c; central, add .40c and .65c; western, add 1c and 1.85c—high nitrogen, high carbon ferrochrome; Add 5c to all high carbon ferrochrome prices; all zones; low carbon eastern, bulk, c.l. max. 0.06% carbon, 23c, 0.10% 22.50c, 0.15% 22c, 0.20% 21.50c, 0.50% 21c, 1.00% 20.50c, 2.00% 19.50c; 2000 lb. to c.l., 0.06% 24c, 0.10% 23.50c, 0.15% 23c, 0.20% 22.50c, 0.50% 22c, 1.00% 21.50c, 2.00% 20.50c; central, add .4c for bulk, c.l. and .65 for 2000 lb. to c.l.; western, add 1c for bulk, c.l. and 1.85c for 2000 lb. c.l.; carload packed differential .45c; f.o.b. shipping point, freight allowed. Prices per lb. contained Cr high nitrogen, low carbon ferrochrome: Add 2c to low carbon ferrochrome prices; all zones. For higher nitrogen carbon add 2c for each .25% of nitrogen over 0.75%.

Special Foundry ferrochrome: (Chrom. 62-66%, car. approx. 5-7%) Contract, carload, bulk 13.50c, packed 13.95c, ton lots 14.40c, less, 14.90c, eastern, freight allowed, per pound contained chromium; 13.90c, 14.35c, 15.05c and 15.55c central; 14.50c, 14.95c, 16.25c and 16.75c, western; spot up .25c.

S.M. Ferrochrome, high carbon: (Chrom: 60-65%, sil. 4-6%, mang. 4-6% and carbon 4-6%.) Contract, carlot, bulk, 14.00c, packed 14.45c, ton lots 14.90c, less 15.40c, eastern, freight allowed; 14.40c, 14.85c, 15.55c and 16.05c, central; 15.00c, 15.45c, 16.75c and 17.25c, western; spot up .25c; per pound contained chromium.

S.M. Ferrochrome, low carbon: (Chrom. 62-66%, sil. 4-6%, mang. 4-6% and carbon 1.25% max.) Contract, carlot, bulk, 20.00c, packed 20.45c, ton lots 21.00c, less ton lots 22.00c, eastern, freight allowed, per pound contained chromium, 20.40c, 20.85c, 21.65c and 22.65c, central; 21.00c, 21.45c, 22.85c and 23.85c, western; spot up .25c.

SMZ Alloy: (Silicon 60-65%, Mang. 5-7%, zir. 5-7% and iron approx. 20%) per lb. of alloy contract carlots 11.50c, ton lots 12.00c, less 12.50c, eastern zone, freight allowed; 12.00c, 12.85c and 13.35c central zone; 14.05c, 14.60c and 15.10c, western; spot up .25c.

Silcaz Alloy: (Sil. 35-40%, cal. 9-11%, alum. 6-8%, zir. 3-5%, tit. 9-11% and boron 0.55-0.75%), per lb. of alloy contract, carlots 25.00c, ton lots 26.00c, less ton lots 27.00c, eastern, freight allowed, 25.50c, 26.75c and 27.75c, central; 27.50c, 28.90c and 29.90c, western; spot up .25c.

Silvaz Alloy: (Sil. 35-40%, van. 9-11%, alum. 5-7%, zir. 5-7%, tit. 9-11% and boron 0.55-0.75%), per lb. of alloy. Contract, carlots 58.00c, ton lots 59.00c, less 60.00c, eastern, freight allowed; 58.50c, 59.75c and 60.75c, central; 60.50c, 61.90c and 62.90c, western; spot up ¼c.

CMSZ Alloy 4: (Chr. 45-49%, mang. 4-6%, sil. 18-21%, zir. 1.25-1.75%, and car. 3.00-4.50%). Contract carlots, bulk, 11.00c and packed 11.50c; ton lots 12.00c; less 12.50c, eastern, freight allowed; 11.50c and 12.00c, 12.75c, 13.25c, central; 13.50c and 14.00c, 14.75c, 15.25c, western; spot up .25c.

CMSZ Alloy 5: (Chr. 50-56%, mang. 4-6%, sil. 13.50-16.00%, zir. .75-1.25%, car. 3.50-5.00%) per lb. of alloy. Contract, carlots, bulk, 10.75c, packed 11.25c, ton lots 11.75c, less 12.25c, eastern, freight allowed; 11.25c, 11.75c and 12.50c, central; 13.25c and 13.75c, 14.50c and 15.00c, western; spot up .25c.

Ferro-Boron: (Bor. 17.50% min., sil. 1.50% max., alum. 0.50% max. and car. 0.50% max.) per lb. of alloy contract ton lots, $1.20, less ton lots $1.30, eastern, freight allowed; $1.2075 and $1.3075 central; $1.229 and $1.329, western; spot add 5c.

Manganese-Boron: (Mang. 75% approx., boron 15-20%, iron 5% max. sil. 1.50% max. and carbon 3% max.), per lb. of alloy. Contract ton lots, $1.89, less $2.01, eastern; freight allowed; $1.903 and $2.023, central, $1.935 and $2.055 western; spot up 5c.

Nickel-Boron: (Bor. 15-18%, alum. 1% max., sil. 1.50% max., car. 0.50% max., iron 3% max., nickel, balance), per lb. of alloy. Contract, 5 tons or more, $1.90, 1 ton to 5 tons, $2.00, less than ton $2.10, eastern, freight allowed; $1.9125, $2.0125 and $2.1125, central; $1.9445, $2.0445 and $2.1445, western; spot same as contract.

Chromium-Copper: (Chrom. 8-11%, cu. 88-90%, iron 1% max. sil. 0.50% max.) contract, any quantity, 45c, eastern, Niagara Falls, N. Y., basis, freight allowed to destination, except to points taking rate in excess of St. Louis rate to which equivalent of St. Louis rate will be allowed; spot up 2c.

Vanadium Oxide: (Fused: Vanadium oxide 85-88%, sodium oxide approx. 10% and calcium oxide, approx. 2%, or Red Cake; Vanadium oxide 85% approx., sodium oxide, approx. 9% and water approx.

2.5%) Contract, any quantity, $1.10 eastern, freight allowed per pound vanadium oxide contained; contract carlots, $1.105, less carlots, $1.108, central; $1.118 and $1.133, western; spot add 5c to contracts in all cases.

Calcium metal; cast: Contract ton lots or more $1.35, less, $1.60, pound of metal; $1.36 and $1.61 central, $1.40 and $1.65, western; spot up 5c.

Calcium-Manganese-Silicon: (Cal. 16-20% mang. 14-18% and sil. 53-59%), per lb. of alloy. Contract, carlots, 15.50c, ton lots 16.50c and less 17.00c, eastern, freight allowed; 16.00c, 17.35c, and 17.85c, central; 18.05c, 19.10c and 19.60c western; spot up .25c.

Calcium-Silicon: (Cal. 30-35%, sil. 60-65% and iron 3.00% max.), per lb. of alloy. Contract, carlot, lump 18.00c, ton lots 14.50c, less 15.50c, eastern, freight allowed; 13.50c, 15.25c and 16.25c central; 15.55c, 17.40c and 18.40c, western; spot up .25c.

Briquets, Ferromanganese: (Weight approx. 3 lbs. and containing exactly 2 lbs. mang.) per lb. of briquets. Contract, carlots, bulk .0605c, packed .063c, tons .0655c, less .068c eastern freight allowed; .063c, .0655c, .0755c and .078c, central; .066c, .0685c, .0855c, and .088c, western; spot up .25c.

Briquets: Ferrochrome, containing exactly 2 lb. cr., eastern zone, bulk, c.l., 8.25c per lb. of briquets, 2000 lb. to c.l., 8.75c; central, add .3c for c.l. and .5c for 2000 lb. to c.l.; western, add .70c for c.l., and .2c for 2000 lb. to c.l.; **silicomanganese,** eastern, containing exactly 2 lb. manganese and approx. ½ lb. silicon, bulk, c.l., 5.80c, 2000 lbs. to c.l., 6.30c; central, add .25c for c.l. and 1c for 2000 lb. to c.l.; western, add .5c for c.l., and 2c for 2000 lb. to c.l.; **ferrosilicon, eastern,** approx. 5 lb., containing exactly 2 lb. silicon, or weighing approx. 2½ lb. and containing exactly 1 lb. of silicon, bulk, c.l., 3.35c, 2000 lb. to c.l., 3.80c; central, add 1.50c for c.l., and .40c for 2000 lb. to c.l.; western, add 3.0c for c.l. and .45c for 2000 to c.l.; f.o.b. shipping point, freight allowed.

Ferromolybdenum: 55-75% per lb. contained molybdenum f.o.b. Langeloth and Washington, Pa., furnace, any quantity 95.00c.

Ferrophosphorus: 17-19%, based on 18% phosphorus content, with unitage of $3 for each 1% of phosphorus above or below the base; gross tons per carload f.o.b. sellers' works, with freight equalized with Rockdale, Tenn.; contract price $58.50, spot $62.25.

Ferrosilicon: Eastern zone, 90-95%, bulk, c.l., 11.05c, 2000 lb. to c.l., 12.30c; 80-90%, bulk c.l., 8.90c, 2000 lb. to c.l., 9.95c; 75%, bulk, c.l., 8.05c, 2000 lb. to c.l., 9.05c; 50%, bulk c.l., 6.65c and 2000 lb. to c.l., 7.85c; central 90-95%, bulk, c.l., 11.20c, 2000 lb. to c.l., 12.80c; 80-90%, bulk, c.l., 9.05c, 2000 to c.l., 10.45c; 75%, bulk, c.l., 8.20c, 2000 lb. to c.l., 9.65c; 50% bulk, c.l., 7.10c, 2000 lb. to c.l., 9.70c; western, 90-95%, bulk, c.l., 11.65c, 2000 lb. to c.l., 15.60c; 80-90%, bulk, c.l., 9.35c, 2000 lb. to c.l., 13.50c; 75%, bulk, c.l., 8.75c, 2000 to c.l., 13.10c; 50%, bulk, c.l., 7.25c, 2000 to c.l., 8.75c; f.o.b. shipping point, freight allowed. Prices per lb. contained silicon.

Grainal: Vanadium Grainal No. 1 87.5c; No. 6, 60c; No. 79, 45c; all f.o.b. Bridgeville, Pa., usual freight allowance.

Silicon Metal: Min. 97% silicon and max. 1% iron, eastern zone, bulk, c.l., 12.90c; 2000 lb. to c.l., 13.45c; central, 13.20c and 13.90c; western, 13.85c and 16.80c; min. 96% silicon and max. 2% iron, eastern, bulk, c.l., 12.50c, 2000 lb. to c.l., 13.10c; central, 12.80c and 13.55c; western, 13.45c and 16.50c f.o.b. shipping point, freight allowed. Price per lb. contained silicon.

Manganese Metal: (98% min. manganese, max. 2% iron), per lb. of metal, eastern zone, bulk, c.l., 30c, 2000 lb. to c.l., 32c, central, 30.25c, and 33c; western 30.55c and 35.05c.

Ferrotungsten: Spot, 10,000 lb. or more, per lb. contained tungsten, $1.90; contract, $1.88; freight allowed as far west as St. Louis.

Tungsten Metal Powder: Spot, not less than 97 per cent, $2.50-$2.60; freight allowed as far west as St. Louis.

Ferrotitanium: 40-45%, R.R. freight allowed, per lb. contained titanium; ton lots $1.23; less-ton lots $1.25; eastern. Spot up 5 cents per lb.

Ferrotitanium: 20-25%, 0.10 maximum carbon; per lb. contained titanium; ton lots $1.35; less-ton lots $1.40 eastern. Spot 5 cents per lb. higher.

High-Carbon Ferrotitanium: 15-20% contract basis, per net ton, f.o.b. Niagara Falls, N. Y., freight allowed to destination east of Mississippi River and North of Baltimore and St. Louis, 6.8% carbon $142.50; 3-5% carbon $137.50.

Carbortam: Boron 0.90 to 1.15% net ton to carload, 8c lb. f.o.b. Suspension Bridge, N. Y., frt. allowed same as high-carbon ferrotitanium.

Bortam: Boron 1.5-1.9%, ton lots 45c lb., less ton lots 50c lb.

Ferrovanadium: 35-55%, contract basis, per lb. contained vanadium, f.o.b. producers plant with usual freight allowances; open-hearth grade $2.70; special grade $2.80; highly-special grade $2.90.

Zirconium Alloys: 12-15%, per lb. of alloy, eastern contract, carlots, bulk, 4.60c, packed 4.80c, ton lots 4.80c, less tons 5c, carloads, bulk, per gross ton $102.50; packed $107.50; ton lots $108; less-ton lots $112.50. Spot ¼c per ton higher.

Zirconium Alloy: 35-40%, Eastern, contract basis, carloads in bulk or package, per lb. of alloy 14.00c; gross ton lots 15.00c; less-ton lots 16.00c. Spot ¼ cent higher.

Alsifer: (Approx. 20% aluminum, 40% silicon, 40% iron) contract basis f.o.b. Niagara Falls, N. Y., per lb. 5.75c; ton lots 6.50c. Spot ½ cent higher.

Siminal: (Approx. 20% each sl., Mn., Al.) Contract, frt. all. not over St. Louis rate, per lb. alloy; carlots 8c; ton lots 8.75c; less ton lots 9.25c.

Borosil: 3 to 4% boron, 40 to 45% Si., $6.25 lb. cont. Bo., f.o.b. Philo, O., freight not exceeding St. Louis rate allowed.

OPEN MARKET PRICES, IRON AND STEEL SCRAP

Following prices are quotations developed by editors of STEEL in the various centers. For complete OPA ceiling price schedule refer to page 156 of Sept. 4, 1944, issue of STEEL. Quotations are on gross tons.

PHILADELPHIA:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$18.75
No. 2 Heavy Melt. Steel	18.75
No. 2 Bundles	18.75
No. 3 Bundles	16.75
Mixed Borings, Turnings	13.75
Machine Shop Turnings	13.75
Billet, Forge Crops	23.75
Bar Crops, Plate Scrap	21.25
Cast Steel	21.25
Punchings	21.25
Elec. Furnace Bundles	19.75
Heavy Turnings	18.25

Cast Grades

(F.o.b. Shipping Point)

Heavy Breakable Cast	16.50
Charging Box Cast	19.00
Cupola Cast	20.00
Unstripped Motor Blocks	17.50
Malleable	22.00
Chemical Borings	16.51

NEW YORK:

(Dealers' buying prices)

No. 1 Heavy Melt. Steel	$15.33
No. 2 Heavy Melt. Steel	15.33
No. 2 Hyd. Bundles	15.33
No. 3 Hyd. Bundles	13.33
Chemical Borings	14.33
Machine Turnings	10.33
Mixed Borings, Turnings	10.33
No. 1 Cupola	20.00
Charging Box	19.00
Heavy Breakable	16.50
Unstrip Motor Blocks	17.50
Stove Plate	19.00

CLEVELAND:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$19.50
No. 2 Heavy Melt. Steel	19.50
No. 1 Comp. Bundles	19.50
No. 2 Comp. Bundles	19.50
No. 1 Busheling	19.50
Mach. Shop Turnings	14.50
Short Shovel Turnings	16.50
Mixed Borings, Turnings	14.50
No. 1 Cupola Cast	20.00
Heavy Breakable Cast	16.50
Cast Iron Borings	13.50-14.00
Billet, Bloom Crops	24.50
Sheet Bar Crops	22.00
Plate Scrap, Punchings	22.00
Elec. Furnace Bundles	20.50

BOSTON:

(F.o.b. shipping points)

No. 1 Heavy Melt. Steel	$14.06
No. 2 Heavy Melt. Steel	14.06
No. 1 Bundles	14.06
No. 2 Bundles	14.06
No. 1 Busheling	14.06
Machine Shop Turnings	9.06
Mixed Borings, Turnings	9.06
Short Shovel Turnings	11.06
Chemical Borings	13.31
Low Phos. Clippings	16.56
No. 1 Cast	20.00
Clean Auto Cast	20.00
Stove Plate	19.00
Heavy Breakable Cast	16.50

Boston Differential 99 cents higher, steel-making grades; Providence $1.09 higher.

PITTSBURGH:

(Delivered consumer's plant)

Railroad Heavy Melting	$21.00
No. 1 Heavy Melt. Steel	20.00
No. 2 Heavy Melt. Steel	20.00
No. 1 Comp. Bundles	20.00
No. 2 Comp. Bundles	20.00
Short Shovel Turnings	17.00
Mach. Shop Turnings	15.00
Mixed Borings, Turnings	15.00
No. 1 Cupola Cast	20.00
Heavy Breakable Cast	16.50
Cast Iron Borings	16.00
Billet, Bloom Crops	25.00
Sheet Bar Crops	22.50
Plate Scrap, Punchings	22.50
Railroad Specialties	24.50
Scrap Rail	21.50
Axles	28.00
Rail 3 ft. and under	28.50
Railroad Malleable	22.00

VALLEY:

(Delivered consumer's plant)

No. 1 R.R. Heavy Melt.	$21.00
No. 1 Heavy Melt. Steel	20.00
No. 1 Comp. Bundles	20.00
Short Shovel Turnings	17.00
Cast Iron Borings	16.00
Machine Shop Turnings	15.00
Low Phos. Plate	22.50

MANSFIELD, O:

(Delivered consumer's plant)

Machine Shop Turnings	$15.00

BIRMINGHAM:

(Delivered consumer's plant)

Billet Forge Crops	$22.00
Structural, Plate Scrap	19.00
Scrap Rails Random	18.50
Rerolling Rails	20.50
Angle Splice Bars	20.50
Solid Steel Axles	24.00
Cupola Cast	20.00
Stove Plate	19.00
Long Turnings	8.50- 9.00
Cast Iron Borings	8.50- 9.00
Iron Car Wheels	16.50-17.00

CHICAGO:

(Delivered consumer's plant)

No. 1 R.R. Heavy Melt.	$19.75
No. 1 Heavy Melt. Steel	18.75
No. 2 Heavy Melt. Steel	18.75
No. 1 Ind. Bundles	18.75
No. 2 Dlr. Bundles	18.75
Baled Mach. Shop Turn.	18.75
No. 3 Galv. Bundles	16.75
Machine Turnings	13.75
Mix. Borings, Sht. Turn.	13.75
Short Shovel Turnings	15.75
Cast Iron Borings	14.75
Scrap Rails	20.25
Cut Rails, 3 feet	22.25
Cut Rails, 18-inch	23.50
Angles, Splice Bars	22.25
Plate Scrap, Punchings	21.25
Railroad Specialties	22.75
No. 1 Cast	20.00
R.R. Malleable	22.00

(Cast grades f.o.b. shipping point, railroad grades f.o.b. tracks)

BUFFALO:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$19.25
No. 2 Heavy Melt. Steel	19.25
No. 1 Bundles	19.25
No. 2 Bundles	19.25
No. 1 Busheling	19.25
Machine Turnings	14.25
Short Shovel Turnings	16.25
Mixed Borings, Turn.	14.25
Cast Iron Borings	15.25
Low Phos.	21.75

DETROIT:

(Delivered consumer's plant)

Heavy Melting Steel	$17.32
No. 1 Busheling	17.32
Hydraulic Bundles	17.32
Flashings	17.32
Machine Turnings	12.32
Short Shovel, Turnings	14.32
Cast Iron Borings	13.32
Low Phos. Plate	19.82
No. 1 Cast	20.00
Heavy Breakable Cast	16.50

ST. LOUIS:

(Delivered consumer's plant)

Heavy Melting	17.50
No. 1 Locomotive Tires	20.00
Misc. Rails	19.00
Railroad Springs	22.00
Bundled Sheets	17.50
Axle Turnings	17.00
Machine Turnings	10.50
Shoveling Turnings	12.50
Rerolling Rails	21.00
Steel Car Axles	21.50-22.00
Steel Rails, 3 ft.	21.50
Steel Angle Bars	21.00
Cast Iron Wheels	20.00
No. 1 Machinery Cast	20.00
Railroad Malleable	22.00
Breakable Cast	16.50
Stove Plate	19.00
Grate Bars	15.25
Brake Shoes	15.25
(Cast grades f.o.b. shipping point)	
Stove Plate	18.00

CINCINNATI:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$18.50
No. 2 Heavy Melt. Steel	18.50
No. 1 Comp. Bundles	18.50
No. 2 Comp. Bundles	18.50
Machine Turnings	9.50-10.00
Shoveling Turnings	11.50-12.00
Cast Iron Borings	11.00-11.50
Mixed Borings, Turnings	10.50-11.00
No. 1 Cupola Cast	20.00
Breakable Cast	16.50
Low Phosphorus	21.00-21.50
Scrap Rails	20.50-21.00
Stove Plate	16.00-16.50

LOS ANGELES:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$14.00
No. 2 Heavy Melt. Steel	13.00
No. 1, 2 Deal. Bundles	12.00
Machine Turnings	4.50
Mixed Borings, Turnings	4.00
No. 1 Cast	20.00

SAN FRANCISCO:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$15.50
No. 2 Heavy Melt. Steel	14.50
No. 1 Busheling	15.50
No. 1, No. 2 Bundles	13.50
No. 3 Bundles	9.00
Machine Turnings	7.00
Billet, Forge Crops	15.50
Bar Crops, Plate	15.50
Cast Steel	15.50
Cut, Structural, Plate, 1", under	18.00
Alloy-free Turnings	7.00
Tin Can Bundles	14.50
No. 2 Steel Wheels	15.50
Iron, Steel Axles	23.00
No. 2 Cast Steel	15.50
Uncut Frogs, Switches	15.50
Scrap Rails	15.50
Locomotive Tires	15.50

Copper: Electrolytic or Lake from producers in carlots 12.00c, Del. Conn., less carlots 12.12½c, refinery; dealers may add ¾c for 5000 lbs. to carload; 1000-4999 lbs. 1c; 500-999 1½c; 0-499 2c. Casting, 11.75c, refinery for 20,000 lbs., or more. 12.00c less than 20,000 lbs.

Brass Ingot: Carlot prices, including 25 cents per hundred freight allownace; add ¼c for less than 20 tons; 85-5-5-5 (No. 115) 13.00c; 88-10-2 (No. 215) 16.50c; 80-10-10 (No. 305) 15.75c; Navy G (No. 225) 16.75c; Navy M (No. 245) 14.75c; No. 1 yellow (No. 405) 10.00c; manganese bronze (No. 420) 12.75c.

Zinc: Prime western 8.25c, select 8.35c, brass special 8.50c, intermediate 8.75c, E. St. Louis, for larlots. For 20,000 lbs. to carlots add 0.15c; 10,000-20,000 0.25c; 2000-10,000 0.40c; under 2000 0.50c.

Lead: Common 6.35c, chemical, 6.45c, corroding, 6.45, E. St. Louis for carloads; add 5 points for Chicago, Minneapolis-St. Paul, Milwaukee-Kenosha districts; add 15 points for Cleveland-Akron-Detroit area, New Jersey, New York state, Texas, Pacific Coast, Richmond, Indianapolis-Kokomo; add 20 points for Birmingham, Connecticut, Boston-Worcester, Springfield, New Hampshire, Rhode Island.

Primary Aluminum: 99% plus, ingots 15.00c del., pigs 14.00c del.; metallurgical 94% min. 13.50c del. Base 10,000 lbs. and over; add ½c 2000-9999 lbs.; 1c less through 2000 lbs.

Secondary Aluminum: All grades 12.50c per lb. except as follows: Low grade piston alloy (No. 122 type) 10.50c; No. 12 foundry alloy (No. 2 grade) 10.50c; chemical warfare service ingot (92½% plus) 10.00c; steel deoxidizers in notch bars, granulated or shot, Grade 1 (95-97½%) 11.00c, Grade 2 (92-95%) 9.50c to 9.75c, Grade 3 (90-92%) 8.00c to 8.25c, Grade 4 (85-90%) 7.75c; any other ingot containing over 1% iron, except PM 754 and hardeners, 12.00c. Above prices for 30,000 lb. or more; add ¼c 10,000-30,000 lb.; ½c 1000-10,000 lbs.; 1c less than 1000 lbs. Prices include freight at carload rate up to 75 cents per hundred.

Magnesium: Commercially pure (99.8%) standard ingots (4-notch, 17 lbs.) 2.50c lb., add 1c for special shapes and sizes. Allyo ingots, incendiary bomb alloy, 23.40c; 50-50 magnesium-aluminum, 23.75c; ASTM B93-41T, Nos. 2, 3, 4, 12, 13, 14, 17, 23.00c; Nos. 4X, 11, 13X, 17X, 25.00c; ASTM B-107-41T, or B-90-41T, No. 8X, 23.00c; No. 18, 23.50c; No. 18X, 25.00c. Selected magnesium crystals, crowns, and muffs, including all packing screening, barreiling, handling, and other preparation charges, 23.50c. Price for 100 lbs. or more; for 25-100 lbs., add 10c; for less than 25 lbs., 20c. Incendiary bomb alloy, f.o.b. plant, any quantity; carload freight allowed all other alloys for 500 lbs. or more.

Tin: Prices ex-dock, New York in 5-ton lots, Add 1 cent for 2240-11,199 lbs., 1½c 1000-2239. 2°c 500-999, 3c under 500. Grade A, 99.8% or higher (includes Straits), 52.00c; Grade B, 99.8% or higher, not meeting specifications for Grade A, with 0.05 per cent maximum arsenic, 51.87½c; Grade C, 99.65-99.79% incl. 51.62½c; Grade D, 99.50-99.64% incl., 51.50c; Grade E, 99-99.49% incl. 51.12½c; Grade F, below 99% (for tin content), 51.00c.

Antimony: American bulk carlots f.o.b. Laredo, Tex., 99.0% to 99.8% and 99.8% and over but not meeting specifications below, 14.50c; 99.8% and over (arsenic, 0.05%, max. and other impurities, 0.1%, max.) 15.00c. On producers' sales add ¼c for less than carload to 10,000 lb.; ½c for 9999-224 lb.; and 2c for 223 lb. and less; on sales by dealers, distributors and jobbers add ½c, 1c, and 3c, respectively.

Nickel: Electrolytic cathodes, 99.5%, f.o.b. refinery 35.00c lb.; pig and shot produced from electrolytic cathodes 36.00c; "F" nickel shot or ingot for additions to cast iron, 34.00c; Monel shot 28.00c.

Mercury: Open market, spot, New York, $103-$106 per 76-lb. flask.

Arsenic: Prime, white, 99%, carlots, 4.00c lb.

Beryllium-Copper: 3.75-4.25% Be., $17 lb. contained Be.

Cadmium: Bars, ingots, pencils, pigs, plates, rods, slabs, sticks, and all other "regular" straight or flat forms 90.00c lb., del.; anodes, balls, discs and all other special or patented shapes 95.00c lb. del.

Cobalt: 97-99%, $1.50 lb., for 550 lb. (bbl.); $1.52 lb. for 100 lb. (case); $1.57 lb. under 100 lb.

Indium: 99.9%, $7.50 per troy ounce.

Gold: U. S. Treasury, $35 per ounce.

Silver: Open market, N. Y. 70.625c per ounce.

Platinum: $35 per ounce.

Iridium: $165 per troy ounce.

Palladium: $24 per troy ounce.

Rolled, Drawn, Extruded Products

(Copper and brass product prices based on 12.00c, Conn., for Copper. Freight prepaid on 100 lbs. or more.

Sheet: Copper 20.87c; yellow brass 19.48c; commercial bronze, 90% 21.07c, 95% 21.28c; red brass 80% 20.15c, 85% 20.36c; phosphor bronze, Grades A and B 5% 36.25c; Everdur, Herculoy, Duronze or equiv. 26.00c; naval brass 24.50c; manganese bronze 28.00c; Muntz metal 22.75c; nickel silver 5% 26.50c.

Rods: Copper, hot-rolled 17.37c, cold-rolled 18.37c; yellow brass 15.01c; commercial bronze 90% 21.32c, 95% 21.53c; red brass 80% 20.48c, 85% 20.61c; phosphor bronze Grade A, B 5% 36.50c; Everdur, Herculoy, Duronze or equiv. 25.50c; Naval brass 19.12c; manganese bronze 22.50c; Muntz metal 18.87c; nickel silver 5% 26.50c.

Seamless Tubing: Copper 21.37c; yellow brass 22.23c; commercial bronze 90% 23.47c; red brass 80% 22.80c, 85% 23.01c.

Extruded Shapes: Copper 20.87c; architectural bronze 19.12c; manganese bronze 24.00c; Muntz metal 20.12c; Naval brass 20.37c.

Angles and Channels: Yellow brass 27.98c; commercial bronze 90% 29.75c, 95% 29.78c; red brass 80% 28.65c, 85% 28.86c.

Copper Wire: Soft, f.o.b. Eastern mills, carlots 15.37½c, less-carlots 15.87°c; weatherproof, f.o.b. Eastern mills, cariot 17.00c, less-carlots 17.50c; magnet, delivered carlots 17.50c, 15,000 lbs. or more 17.75c, less carlots 18.25c.

Aluminum Sheets and Circles: 2s and 3s flat mill finish, base 30,000 lbs. or more; del.; sheet widths as indicated; circle diameter 9" and larger:

Gage	Width	Sheets	Circles
.249"-7	12"-48"	22.70c	25.20c
8-10	12"-48"	23.20c	25.70c
11-12	26"-48"	24.20c	27.00c
13-14	26"-48"	25.20c	28.80c
15-16	26"-48"	26.40c	30.40c
17-18	26"-48"	27.90c	32.90c
19-20	24"-42"	29.80c	35.30c
21-22	24"-42"	31.70c	37.20c
23-24	3"-24"	25.60c	29.20c

Lead Products: Prices to jobbers; full sheets 9.50c; cut sheets 9.75c; pipe 8.15c, New York; 8.25c, Philadelphia, Baltimore, Rochester and Buffalo; 8.75c, Chicago, Cleveland, Worcester, Boston.

Zinc Products: Sheet f.o.b. mill, 13.15c; 36,000 lbs. and over deduct 7%; Ribbon and strip 12.25c, 3000-lb. lots deduct 1%, 6000 lbs. 2%, 9000 lbs. 3%, 18,000 lbs. 4%, carloads and over 7%. Boiler plate (not over 12") 3 tons and over 11.00c; 1-3 tons 12.00c; 500-2000 lbs. 12.50c; 100-500 lbs. 13.00c; under 100 lbs. 14.00c. Hull plate (over 12") add 1c to boiler plate prices.

Plating Materials

Chromic Acid: 99.75%, flake, del., carloads 16.25c; 5 tons and over 16.75c; 1-5 tons 17.25c; 400 lbs. to 1 ton 17.75c; under 400 lbs. 18.25c.

Copper Anodes: Base 2000-5000 lbs., del.; oval 17.62c; untrimmed 18.12c; electro-deposited 17.37c.

Copper Carbonate: 52-54% metallic cu, 250 lb. barrels 20.50c.

Copper Cyanide: 70-71% cu, 100-lb. kegs or bbls. 34.00c f.o.b. Niagara Falls.

Sodium Cianide: 96%, 200-lb. drums 15.00c; 10,000-lb. lots 13.00c f.o.b. Niagara Falls.

Nickel Anodes: 500-2999 lb. lots; cast and rolled carbonized 47.00c; rolled depolarized 48.00c.

Nickel Chloride: 100-lb. kegs or 275-lb. bbls. 18.00c lb., del.

Tin Anodes: 1000 lbs. and over 58.50c del.; 500-999 59.00c; 200-499 59.50c; 100-199 61.00c. **Tin Crystals:** 400 lb. bbls. 39.00c f.o.b. Grasselli, N. J.; 100-lb. kegs 39.50c.

Sodium Stannate: 100 or 300-lb. drums 36.50c, del.; ton lots 35.50c.

Zinc Cyanide: 100-lb. kegs or bbls. 33.00c f.o.b. Niagara Falls.

Brass Mill Allowances: Prices for less than 15,000 lbs. f.o.b. shipping point. Add ¾c for 15,000-40,000 lbs.; 1c for 40,000 or more.

Scrap Metals

	Clean Heavy	Rod Ends	Clean Turnings
Copper	10.250	10.250	9.500
Tinned Copper	9.625	9.625	9.375
Yellow Brass	8.625	8.375	7.785
Commercial bronze			
90%	9.375	9.125	8.625
95%	9.500	9.250	8.750
Red Brass, 85%	9.125	8.875	8.375
Red Brass, 80%	9.125	8.875	8.375
Muntz Metal	8.000	7.750	7.250
Nickel Sil, 5%	9.250	9.000	4.625
Phos. br., A, B, 5%	11.000	10.750	9.750
Herculoy, Everdur or equivalent	10.250	10.000	9.250
Naval brass	8.250	8.000	7.500
Mang. bronze	8.250	8.000	7.500

Other than Brass Mill Scrap: Prices apply on material not meeting brass mill specifications and are f.o.b. shipping point; add ¾c for shipment of 60,000 lbs. of one group and ½c for 20,000 lbs. of second group shipped in same car. Typical prices follow:

(Group 1) No. 1 heavy copper and wire, No. 1 tinned copper, copper borings 9.75c; No. 2 copper wire and mixed heavy copper, copper tuyeres 8.75c.

(Group 2) soft red brass and borings, aluminum bronze 9.00c; copper-nickel and borings 9.25c; car boxes, cocks and faucets 7.75c; bell metal 15.50c; babbit-lined brass bushings 13.00c.

(Group 3) zincy bronze borings, Admiralty condenser tubes, brass pipe 7.50c; Muntz metal condenser tubes 7.00c; yellow brass 6.25c; manganese bronze (lead 0.00%-0.40%) 7.25c, (lead 0.41%-1.0%) 6.25c; manganese bronze borings (lead 0.00-0.40%) 6.50c, (lead 0.41-1.00%) 5.50c.

Aluminum Scrap: Price f.o.b. point of shipment, truckloads of 5000 pounds or over; Segregated solids, 2S, 3S, 5c lb., 11, 14, etc., 3 to 3.50c lb. All other high grade alloys 5c lb. Segregated borings and turnings, wrought alloys, 2, 2.50c lb. Other high-grade alloys 3.50, 4.00c lb. Mixed plant scrap, all solids, 2, 2.50c lb. borings and turnings one cent less than segregated.

Lead Scrap: Prices f.o.b. point of shipment. For soft and hard lead, including cable lead, deduct 0.55c from basing point prices for refined metal.

Zinc Scrap: New clippings 7.25c, old zinc 5.25c f.o.b. point of shipment; add ½-cent for 10,000 lbs. or more. New die-cast scrap, radiator grilles 4.95c, add ½c 20,000 or more. Unsweated zinc dross; die cast slab 5.80c any quantity.

Nickel, Monel Scrap: Prices f.o.b. point of shipment; add ½c for 2000 lbs. or more of nickel or cupro-nickel shipped at one time and 20,000 lbs. or more of Monel. Converters (dealers) allowed 2c premium.

Nickel: 98% or more nickel and not over ½% copper 26.00c; 90-98% nickel, 26.00c per lb. nickel contained.

Cupro-nickel: 90% or more combined nickel and copper 26.00c per lb. contained nickel, plus 8.00c per lb. contained copper; less than 90% combined nickel and copper 26.00c for contained nickel only.

Monel: No. 1 castings, turnings 15.00c; new clipping 20.00c; soldered sheet 18.00c.

Sheets, Strip . . .

Sheet & Strip Prices, Page 200

Efforts to place further tonnage of sheets and strip continue in spite of the fact that some leading consumers are still held idle by strikes. Such new orders as are accepted are not scheduled for rolling, most mills continuing on the schedules laid out before the strike. Some suspensions have been received from strike-bound consumers but the total is not large. Many producers are sold for the entire year.

Pittsburgh — Despite fact some leading consumers' plants remain closed by strikes, sellers report heavy influx of new orders. Tentative delivery dates, at best, can be made on this new tonnage, while none of it is being scheduled at present. Production schedules should be back to normal within three weeks, although in some instances sellers are hopeful of reaching prestrike output somewhat sooner. Except for production affected by suspension orders received from metalworking companies still on strike, little revision in schedules is indicated for next few weeks. Tonnage involved in these suspensions varies between plants, but is considered substantial. In most instances this tonnage will be meshed into production schedules when plants involved reopen.

Once full production is attained mills undoubtedly will review future production schedules on the basis of meeting immediate needs only, in an effort to spread available output as much as possible. Certain groups, such as warehouse interests, may be granted a greater proportion of current output to build up stocks that were badly depleted during the strike. Backlogs on electrical and galvanized sheets are extended into 1947, with most sellers now out of the market. Production lost during the strike represented about two months' output, which virtually places most sellers out of the market for delivery the remainder of this year on hot and cold-rolled sheets.

A few nonintegrated mills resumed operations last week, but most await OPA announcement of advance on specific prices. Those companies that have reopened include: Superior Steel Corp. and Columbia Steel & Shafting Co., Pittsburgh, and Superior Sheet Steel Co., Canton, O. The Navy Redistribution and Disposal office here will take bids March 4 on about 320,000 pounds of carbon and stainless steel sheets located at the Crucible Steel Co.'s Park Works. Same office will take bids March 5 on 48,000 pounds of cold-rolled annealed stainless steel strip in coils, located at Superior Steel Corp., Carnegie, Pa.; and March 6 on 218,400 pounds of hot-rolled strip in coils at Carnegie-Illinois Steel Corp.'s McDonald Works, Youngstown.

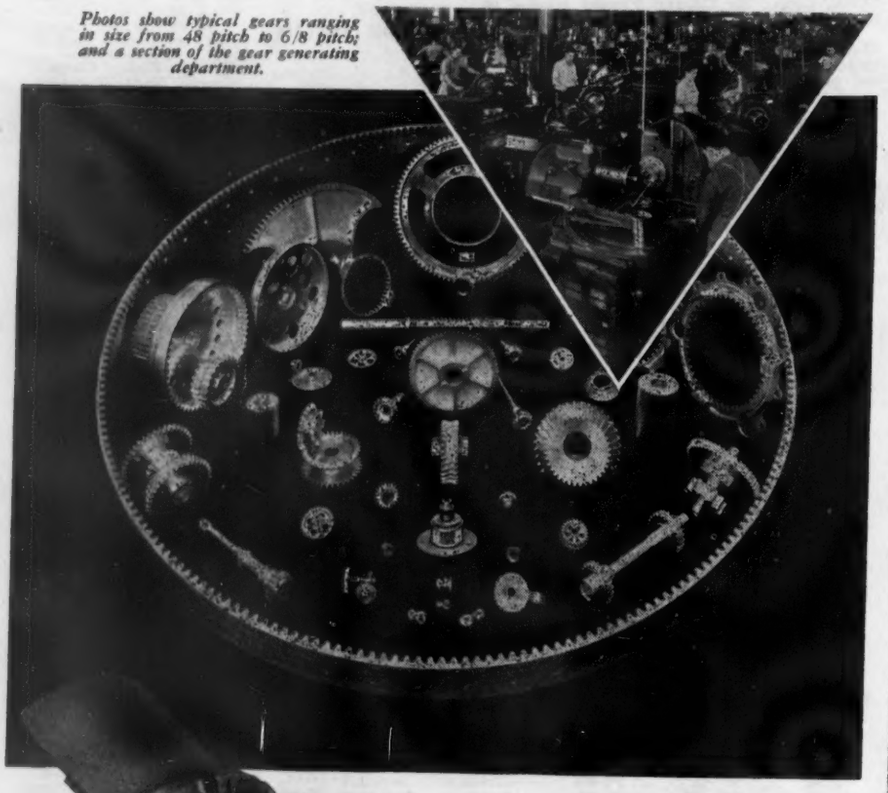
Cincinnati — Sheet mills are besieged by inquiries on deliveries. In some cases, involving specifications on which production was not interrupted by strikes, the tonnage will be moved according to predetermined schedule. Some other products will, of course, be seriously delayed. No promises are forthcoming on sheet orders not yet definitely scheduled. District producers have been making plans on a quarterly basis, with quotas fixed for regular customers. One district mill remains down, pending study of the price-wage situation.

Boston — Narrow cold strip producers are booking orders through the balance of the year as consumers with low inventories resume forward buying; much of this tonnage is tentative as to delivery and price. Inventories of hot strip with cold mills operating through the strike are down, although in one case small shipments trickled in from one producer. Hot-rolled steel is still slow in filling gaps and there is some rescheduling in cold-rolled operations. The prolonged electrical equipment stoppage has a far-reaching effect on sheet buying, notably silicon. To this extent new demand for that grade has recovered less than for hot and cold-finished carbon. Shortages have stimulated sales of terminated surplus, both strip and sheets, of late.

Purchases from surplus include: Eastern Tool & Stamping Co., 130 tons cold-rolled sheets; New England Pressed Steel Co., Natick, Mass., 130 tons oiled cold-rolled sheets and Edward J. Lamothe Co. Inc., Malden, Mass., 130 tons, oiled cold-rolled sheets.

St. Louis — Sheet production is at a standstill, with one mill still in operation turning out strip. A few strip orders are being accepted for indefinite delivery. Sheets are booked through 1946 and no 1947 business is being taken, pending the strike outcome. Orders will be taken up in sequence when production is resumed but it seems certain schedules will be set back at least two months. The practice of informal al-

Photos show typical gears ranging in size from 48 pitch to 6/8 pitch; and a section of the gear generating department.



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location is to continue. The limited output of strip is in heavy demand and no deliveries are promised before the end of the year.

Cleveland—Rolling mills were gradually increasing output last week, the rate being checked by the small flow of steel from sheet bar mills. Clerical forces are still rearranging order and rolling schedules and are not attempting to enter new orders. Based on schedules already drawn up, most mills have no open space for the balance of the year. Stainless, galvanized and electric silicon sheets are especially tight. Consensus among officials of the leading integrated steel companies is that changes in the OPA price schedule will have little effect on the volume of production this year.

New York — Various sheet consumers, finding their quotas restricted as a result of the recent steel strike, being cut off entirely in some cases where their prewar relationships with certain mills had not been close, are having to do considerable shopping around, and usually without much success. The very extent of the shopping has probably given sheet demand a more active aspect at present than is warranted by the tonnage involved; nevertheless, it is certain that demand is far in excess of the capacity of sheet mills to handle for some months to come.

In addition to hot and cold sheets, on which there is little likelihood of new orders being shipped before the fourth quarter, galvanized, electrical and stainless sheets remain in tight position. There is little if any tonnage available on galvanized and electrical sheets for shipment over the remainder of this year. This is also true of polished stainless sheets, with unpolished material deliveries tightening. Some producers have little unpolished stainless available before late September or early October.

Birmingham — Inquiries for sheets are somewhat off, but the situation is characterized as temporary and a marked scarcity of sheets is evident throughout the trade territory. This is especially applicable to roofing sheets.

Chicago — Although sheet orders continue heavy, it is estimated that they run only about 50 per cent of capacity. This is because many consumers are obliged to realign their own plant schedules, due either to strikes in their own plants or loss of production from the steel strike. One producer has not accepted business beyond second quarter and is now planning to utilize third quarter to get caught up with loss of production during the strike and about 30 days carryover existing prior to the strike. This is expected to take all third quarter output. Another sheetmaker has established April and May as a two-month clean-up period and has set orders scheduled for this period back to June and July. Furthermore, to get maximum production, it has set 5 tons as the minimum quantity per order, except for galvanized, roofing and electrical sheets. Stainless sheet distributors can no longer place orders with this mill for direct shipment to customers.

Steel Bars . . .

Bar Prices, Page 200

Deliveries on current buying of hot-rolled carbon bars fall mainly in fourth quarter. Delivery of tonnage on books has been set back about two months, January promises being deferred to March, in general. Cold-drawn bars can be promised for August and September, depending somewhat on deliveries of hot bars for their conversion. Some orders by users held idle by strikes have been suspended, forcing some revision in rolling schedules.

Pittsburgh — Sellers still are unable to give a clear idea of future delivery except to state shipments formerly promised for late January should be shipped during March and other orders correspondingly pushed back. It is estimated most producers are booked through remainder of this year on small sizes, with medium and large specifications extended into fourth quarter. Second quarter delivery is available on most alloy specifications. Cold drawers have order backlogs extending into third quarter, although this position is largely dependent on uncertain mill deliveries. Columbia Steel & Shafting Co., one of the largest hot-rolled bar consumers here, reopened last week. Suspension orders received from a number of metalworking companies still closed have forced some revision in current mill rolling schedules. Otherwise producers resumed production schedules largely at point where operations were stopped by the strike.

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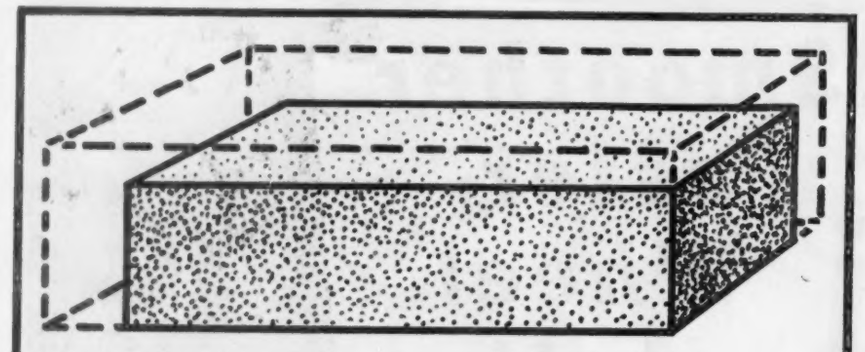
liveries fall mainly in fourth quarter, with some mills booked solidly even through that period. Cold-drawn carbon bars, however, can be obtained in August and early September in some cases and hot alloy bars in late March and early second quarter. Demand is highly diversified, with jobbers the largest single buying group at present and expressing willingness to take tonnage in a variety of sizes. Bolt and nut manufacturers are more selective in their requirements, pressing particularly for small sizes.

Boston—Bar fabricators seeking to bolster depleted inventories of carbon stock are unable to place new orders for numerous small sizes before fourth quarter delivery. New buying on this basis has not snapped back briskly, although pressure for delivery of tonnage already placed is heavier. Most first quarter volume will go over to next quarter. As most consumers have been operating, including forge shops, some on curtailed schedules, margin in steel inventories will be close for some weeks. Alloy bars are less critical and hot-rolled are available for April delivery.

Cleveland—New OPA prices will have little, if any, effect on volume of steel bar production by leading integrated companies. These firms have sufficient orders on file to keep most mills operating at capacity through the year. While some mills have restricted schedules to a maximum of 90 days, others have extended their prestrike schedules and in many of these instances schedules are extended into first quarter of 1947.

New York — Hot carbon bar shipments are being resumed on a somewhat larger scale, although production is not expected to recover fully from the steel strike much before the middle of this month. Most producrs now quoting are adding six to eight weeks to their schedules to allow for the strike disruptions. This places delivery promises on practically all sizes in fourth quarter, with some sellers asserting they have no capacity left for 1946. Cold-drawn carbon bars, however, are available for delivery in third quarter and hot alloy bars for shipment in early April in certain instances.



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Steel Plates . . .

Plate Prices, Page 201

Plate production is recovering slowly from effects of the strike and consumers in many cases are unable to use as much as usual, being held back by labor difficulties. Demand is not as pressing as a few weeks ago, reflecting the interruption to fabrication. However, most mills have bookings that will keep them occupied into fourth quarter.

New York—Plate demand is only fair, still well short of prestrike volume. This reflects restricted consumer operations, due principally to continued labor disputes at many plants; also in a less degree, extended mill deliveries which are now being tentatively quoted. Recent unsettlement with respect to prices also has been a factor, but not as much, it appears, as might be supposed.

Plate production is recovering rather slowly from the strike, with at least one eastern plate mill still down as the week drew to a close. On the other hand, one eastern Pennsylvania mill started melting last Thursday and it is expected that most seaboard producers will be nearing full operation by the middle of the month. Delay to date in some important cases has been due to shortage of pig iron, primarily.

While various plate fabricators are still down, they anticipate substantial operations once their labor disputes are adjusted. They believe that sharply advancing costs will restrict many municipal and other public works programs which have been contemplated, but that increasing costs will not interfere greatly with expanding industrial demand for tanks.

So far, they claim, postwar demand from industrial concerns have held up much better than originally anticipated and even now there appears to be no material decline in prospect. Various tank makers had believed that as soon as the war was over they would have to do considerable promotional work among municipalities and other public buyers to maintain a profitable rate of operations. However, to date this has not appeared necessary. Strong demand is still in prospect for water and gasoline tanks for various industrial buyers and for special containers for chemical and dairy industries.

Most plate mills have little tonnage available for shipment before fourth quarter, on the basis of the present outlook.

Boston — Plate deliveries against old orders are still small and replacement tonnage thus far has been below expec-

tations; same holds for heads, which in some instances have further reduced tank fabricating schedules. There is some buying for late third quarter delivery, but consumers uncertain of their own costs and prices are inclined to go slowly. Most already have tonnage entered for delivery before third quarter, on which shipment is uncertain, but sure to be delayed, notably in small gages.

Philadelphia — The Coatesville, Pa., plate mill started production Thursday, leaving only one district plate producer to resume operations as the week closed. In no case, however, are district plate mills back to full production, due principally to difficulty in getting pig iron. Plate demand appears somewhat irregular, with some sellers reporting inquiry as brisk and others as only fair. They are agreed, however, that plenty of light-gage tonnage is available, far more than most mills are willing to book. Plate deliveries fall principally in fourth quarter, although some mills have openings for September.

Birmingham — Plate business, so far as inquiries are concerned, has not struck the expected stride since the steel strike. This is attributted to the generally correct impression that deliveries are not in immediate sight, and projects are marking time in several instances. Backlogs are heavy and deliveries are delayed four to six months.

Tubular Goods . . .

Tubular Goods Prices, Page 201

Cleveland—Shortage of skelp forced one large butt-weld pipe maker in this district to suspend operations last Tuesday for the balance of the week and caused several other mills to restrict production until a reserve of raw material can be accumulated. Pressure for pipe continues exceedingly heavy, with customers attempting to get a more favorable position on mills schedules. Jobbers' stocks are the lowest in history, but cannot be replenished readily, due to the voluntary allocation system. One large producer is rapidly restoring his facilities to the production of civilian pipe, having completed his government contracts. This is expected to relieve pressure on mills which have been supplying a larger portion of total demand than is normal.

Wire . . .

Wire Prices, Page 201

Cleveland—Operations at wire mills are irregular, some having attained a fair rate of production while others are still idle, awaiting arrival of wire rods. Mills generally are scheduling ahead only as far as the raw material supply warrants, in most cases 30 days. The new OPA price schedule likely will have a direct bearing on production of individual wire products, although the aggregate tonnage will not be affected. Producers are expected to channel their available supplies of steel into those products on which prices are most favorable.

Pittsburgh—Prospect of increased production of merchant wire products is dependent on extent of price advance for these items. It is rumored that nails and other merchants products may be increased somewhat more than $5 a ton. It is pointed out that production costs on nails, bale ties, woven wire fence, barbed wire, etc., are excessive because of the high cost of zinc and they are also considered a high labor item. Despite lifting of production directives last summer, output of merchant wire items has been restricted, due to the operating loss. Indicative of this situation, jobbers' stocks of nails, woven wire fence, barbed wire and bale ties are practically exhausted.

Boston—Recovery in wire production is disappointingly slow. Several New England mills have not resumed operations, still unsigned with labor; output at others lags with rod supplies limited. Uncertainty as to prices and the extent of advances on many specialties produced in this area is a deterrent. Some specialties have been dropped because they are unprofitable and more will be if experience indicates such items are still out of line after advances.

New York—Most consumer inventories are depleted and some will be out of wire before mills will be able to replenish stocks; with large tonnage definitely lost by the strike, producers are making slight progress reducing former lag in delivery schedules. Confronted with strong pressure for shipments and a resumption in forward buying, mills are reducing former quotas frequently. Coupled with tightness in rods, some who expected to approach normal output this month, will not be in that position before April. While most mills strive to take up schedules where they were halted, considerable rescheduling is inevitable.

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Tin Plate . . .

Tin Plate Prices, Page 201

Pittsburgh — Tin plate production is scheduled to be near capacity within 3 to 4 weeks for mills report encouraging progress in getting complete production cycle under way. The huge perishable food pack requirements are expected to absorb most production for the next 90 days at least, as evidenced by fact CPA has directed producers to concentrate production on tin mill products suitable for cans and closures, with special preference for perishable or seasonable food products. Sellers state mill warehouse and consumers' stocks are well below normal as result of steel strike, and indicate some preference may be given to tin plate output in future. No decision has been reached as to what extent first half tin plate export directives will be reinstated. Some sellers believe that due to the present tight supply situation there is some doubt it will be restored even in part.

Bolts, Nuts . . .

Bolt, Nut, Rivet Prices, Page 201

New York — With various bolt and nut plants throughout the country still not back in operation, those that are producing are being confronted with far more demand than they can handle, despite the fact that many consuming plants are still down. This is ascribed to the facts that many buyers are nevertheless active, and that stocks of bolt and nut makers in operation are becoming increasingly unbalanced. Various makers stopped manufacturing certain sizes once their inventories reached a certain percentage of normal and have not been able to step them up again, pending resumption of shipments from mills. Shortage of supply has been pronounced in small sizes, ranging up to ⅞-inch. Heavy inquiry continues from abroad, as well as domestic sources. Domestic building construction requirements are relatively lighter than in most other lines, but they should pick up sharply once general conditions become more stabilized. Eventually a heavy demand is expected to develop for fasteners for pre-fabricated houses.

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Structural Shapes . . .

Structural Shape Prices, Page 201

Philadelphia — One shape mill in this district was still down last week because of a strike and several structural fabricating shops also were idle. Structural inquiries, however, are coming out somewhat more freely, particularly for public bridge work.

Boston—Although industrial building inquiry for structural steel has slackened, new contracts include 400 tons for a woolen mill. Most fabricators are placing new orders for October delivery, tonnage in wanted sizes earlier being limited. Warehouses are also buying, with current stocks out of balance. Indications are the pinch in small sizes over the next few months will continue unless mill schedules are stepped up well over prestrike production.

Chicago — Structural fabricating shops are now feeling the pinch of the steel strike. Material shipped by mills against specific projects plus normal stocks sustained fabricating operations during the past six weeks. Now many jobs are partially completed and must await new shipments before further progress can be made. But shipments will be slow in resuming and will not include full range of shape sizes, with result that erection of many jobs will be delayed for weeks. New inquiries for fabrication have lightened considerably, and awards are also lighter than normal.

New York — Structural activity has become quiet with no important orders and inquiry light. A. J. Healy, New York, is low on the Merriman dam in Ulster county, involving about 550 tons of structurals and 585 tons of interlining, for Board of Water Supply, New York City, at about $14,800,000, about $2 million less than the next lowest. There is question whether this bid will be accepted, however, as it is said to exceed the latest appropriation. Originally the appropriation was $10 million, later increased to $13 million.

Birmingham — Fabricators are extremely impatient about the shape situation. One large company here claims it is receiving about half the needed tonnage. Demand is coming from shipbuilders and the general construction trade, and will be heightened by the state's forthcoming highway construction program, with further delivery delays inevitable.

Reinforcing Bars . . .

Reinforcing Bar Prices, Page 201

New York—An inquiry for 1200 tons is outstanding in an otherwise dull rein-

forcing bar market here. The 1200 tons is for the superstructure of the Elliott housing project of the New York Housing Authority; 200 tons of foundation work were let recently. Lack of steel and uncertainty as to costs are holding demand to a low level.

Pittsburgh — Output of reinforcing bars got under way on a limited basis early last week and is scheduled to reach near prestrike level soon. Sellers are telling customers that tonnage formerly scheduled for February cannot be expected until April, and subsequent months' deliveries are correspondingly pushed back. Prospect of increased output is dependent on extent prices are advanced. Prior to the strike producers' order backlogs represented five to six months output. Uncertainty as to extent wages and steel prices will be increased, plus uncertain effect of strike on steel deliveries, has resulted in a sharp decline in inquiries for construction projects. Progress on construction work under way has been held up by unbalanced steel inventories among fabricators. Reinstatement of first half reinforcing bar export program, at least in part, is held probable. On basis of former allotments for export, some producers were booked ahead 18 months prior to the strike. Dravo Corp., Pittsburgh, recently purchased 300 tons of reinforcing bars from Bethlehem Steel Co., Bethlehem, Pa., for a bridge over Anacostia river, Washington.

Chicago — Short of steel and with prospect for accumulation of supply and stocks poor for some weeks, reinforcing suppliers are actively avoiding making commitments. They show little interest in all except the most attractive of new projects. Awards within the past few days were the lightest in weeks; inquiry, on the other hand, has taken a spurt.

Pig Iron . . .

Pig Iron Prices, Page 203

Blast furnaces banked during the steel strike are slow to get into full production and meanwhile both steelmakers and foundrymen are pressing for supply. Resumption of production in three additional stacks under CPA auspices promises some relief. Tightness in pig iron promises to continue for considerable time.

Pittsburgh — Pig iron is expected to be in short supply through the remainder of this year, as producers' and consumers' stocks are nearly depleted and near record demand is anticipated for many months. Prior to the strike iron supply was critical in the Chicago and other districts, and despite resumption of operations, little improvement is indicated as reconversion requirements climb to full scale. Some relief in the tight iron supply is anticipated as result of CPA's plan to put three additional blast furnaces into operation. However, before this can be accomplished many problems must be met, such as adequate coke and ore supplies and determination of necessary premium prices needed in at least one instance. Tight iron supplies and prospect of growing demand, bring up the prospect of reinstatement of some form of government allocations. However, at the moment such a move does not appear probable. Fact some foundries have remained closed until question of casting prices is settled, has afforded some relief to producers. Extent of pig iron price adjustments is not yet known, but expected momentarily. The lone merchant stack here resumed operations last week, and by the close of the week it was estimated that 48 out of 54 units were producing.

Philadelphia — Following a rather slow start immediately after the break in the steel strike pig iron demand has picked up sharply. Not only are basic consumers pushing hard for iron so as to get their own operations going, but also foundries, which in general find labor supply easier and are confronted by heavy business. Soil pipe manufacturers appear especially in need of iron. The situation is complicated by slow resumption at furnaces which have been down as a result of the steel strike and by the diversion of one district stack which has been operating through the strike, from foundry iron to basic. Shortage of cast scrap also is a complicating factor, particularly as applied to foundries.

New York — While some district foundries are still down, due either to shortage of material or to labor disputes, the over-all melt is picking up slightly, pig iron sellers declare, and with iron shipments beginning to expand, a further gain in consumption is expected. However, the situation is likely to be tight for some time.

Cleveland—Leading producers of pig iron in this district have not yet opened

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books for second quarter delivery. They plan to ship as much tonnage as possible in March and then have the carryover either canceled or applied on second quarter quotas. Demand is heavier than immediately before the steel strike, reflecting the drop in inventories during that period. With open hearths stepping up production steadily, demand for basic pig iron is increasing steadily, obviating the possibility of shifting production from one grade to the other. Due to the unfavorable price level, many stacks operated by nonintegrated companies were kept out of production and will not be placed in blast unless a substantial upward price adjustment is approved by OPA.

Chicago—Foundry iron supply, which during the past six weeks has been critically acute, has now improved appreciably. This results from the fact that a number of furnaces have been returned to blast, as well as release of some tonnage from stacks operating during the strike but unable to ship. Supply will continue tight, however, for steelmaking is running fairly equal to hot metal output. No foundries are known to have shut down during the strike for lack of iron, but numerous curtailments were effected. Demand for castings is tremendous and now that foundries are getting more workers, it is expected that foundry operations will be expanded and melts increased.

Boston—Pressure for iron delivery is intense on the part of numerous consumers; some have small inventories which may be depleted before shipments in normal volume start from Buffalo and eastern Pennsylania. Deliveries are generally going first to foundries with smallest reserves, to head off curtailment in output and consumers are taking iron higher in silicon than usually accepted.

Buffalo—Although merchant iron producers are moving all of current output it does not equal expectations. One mill transferred a furnace from foundry to basic iron over the weekend. A leading merchant seller denies reports that it would aid the Bethlehem Lackawanna mill to return to normal ingot production by supplying direct hot pig iron. This seller reports pressure from foundry customers will not allow curtailment in that grade. Meanwhile Bethlehem is operating only one of its seven blast furnaces. Cold iron is being charged in eight of the plant's 30 open hearths.

Cincinnati—A fairly steady flow of pig iron is supporting the district melt at recent levels, which are considerably below those of fourth quarter. Deliveries on southern iron are, in most cases, better than on northern. Books will be opened soon for second quarter contracts, which will likely be held by furnaces close to tonnages recently allotted. Labor disputes still curtail several major foundries.

St. Louis — Pig iron inventories are improving since smelters have been operating at capacity during the strike. For two weeks they shifted to foundry iron to fill that backed-up demand but now have returned to basic. All is still under government allocation, but some users are reported to have reached the 30-day maximum. Overall pressure for iron, however, is increasing rather than decreasing. The trade is rather optimistic for another pig iron increase.

Birmingham — Pig iron output in Alabama shows considerable upward trend with captive furnaces back in production. Merchant iron melt, however, remains on the basis of seven active furnaces. While demand, as a whole, is being met, the margin between demand and supply, it is indicated, becomes increasingly slim with irregular users hard pressed to obtain requirements.

Scrap . . .

Scrap Prices, Page 204

With steelmaking resumed in most plants, demand for scrap is heavy and all consumers are taking shipments in spite of tonnages accumulated in storage yards during the strike. Industrial scrap is scarce and steel fabricators are operating at a low rate, because of lack of steel supply. Cast scrap is scarce and foundries have a difficult time because of this scarcity at the same time pig iron is short.

Pittsburgh — Brokers and dealers are hard pressed to meet current commitments, for production scrap is scarce as result of continued shutdowns among metalworking companies. Brokers state that it will take 4 to 6 weeks before scrap in quantity will be available from those companies. Mill inventories are somewhat larger than before the steel strike, although still below normal. Scrap consumption at steel plants increased sharply last week and by the end of this week should reach pre-strike volume. Narrowing profit margins of many metalworking companies, as a result of higher labor and raw material costs, are expected to bring additional pressure for higher scrap prices. Among larger companies where monthly scrap volume represents substantial tonnages, the addition of only $1 a ton would constitute an important factor in absorbing increased production costs. Volume of battlefield scrap up for bids has been relatively small in recent weeks. Latest offer includes 4000 tons of miscellaneous unprepared material by the Third Service Command at Frederick, Md., bids Feb. 28.

Philadelphia — While a few district steel mills had not resumed operations at the end of last week, demand for melting steel had increased noticeably at several points. Mills in operation are taking in scrap shipments direct, regardless of whether they have scrap stored in commereial yards. The leading eastern consumer is taking shipments at all plants. In relatively heaviest demand, however, is cast scrap, with neither steel mills nor foundries able to get enough. Some foundries have had to close because of inability to get sufficient cast scrap and pig iron. Some fairly substantial tonnages of government scrap have been offered recently, including 5000 tons of landing mat scrap at Norfolk, Va., and 4200 tons of unprepared miscellaneous steel scrap at Frederick, Md., bids on both lots being opened Feb. 28.

Cleveland—Dealers are exerting every effort to meet the heavy demand for all grades of scrap but there simply is not enough to go around. Shipments are made direct to mills now that the strike is over, instead of to outside storage. Industrial scrap is reduced to a trickle and railroad offerings are unusually light. Yards find it difficult to collect tonnage

and in some cases can scarcely keep their forces busy. Some government scrap is coming out but not in large lots. This material usually contains considerable alloy and must go through yards for sorting as it can not be shipped directly to consumers. Cast scrap is in small supply in face of heavy demand.

New York — Although demand is heavy, scrap is moving relatively slowly, because of shortage. Reduction in manufactured scrap is still pronounced, with shipyards producing far less than a while ago and with other companies turning out little because of restricted operations, from labor disturbances. This not only applies to melting steel grades, but even more particularly to cast scrap.

Boston — Supply of unprepared steel and industrial scrap is limited as shipments are resumed to most normal consuming points. There is brisk bidding for navy yard and other government-offered scrap at ceiling prices, including 2300 tons, future accumulation at the Boston yard. Several foundries have not got back into operation and are still taking no cast scrap. While this eases the tightness in that grade slightly, demand is still in excess of available tonnage.

Buffalo — Scrap continues strong in spite of slow recovery in ingot operations because of damage to Bethlehem's Lackawanna mill. Some buying is done, limited by small offerings. Dealers refuse orders larger than they are certain they can fill.

Chicago — A tight scrap situation seems assured for some time to come. Consumer demand continues high and supply is shrinking, the latter because many steel using plants have curtailed operations because of steel exhaustion. Some weeks will ensue before production scrap attains normal level. Meanwhile, ceiling prices hold. Steel mills just now are making headway in unloading cars. It will be some time before scrap piled at docks and outside storage points will be picked up and brought in, but this will be done as rapidly as expanding steelmaking requires.

St. Louis — Scrap shipments are on the upturn, due to better weather. Demand for all premium grades remains heavy and brokers are able to move all they can obtain. Two weeks of stockpiling for strike-closed steel mills have accumulated good reserves. Terminated scrap still fails to appear in any quantity. All prices are at ceiling.

Birmingham — Scrap has eased considerably. Lifting of the railroad embargo has started movement again. The labor situation has shown some improvement and the district has had several days of continuous good weather, the first in several months, which has greatly aided outside work. Most items, however, are relatively tight and ceiling prices are applicable.

Warehouse . . .

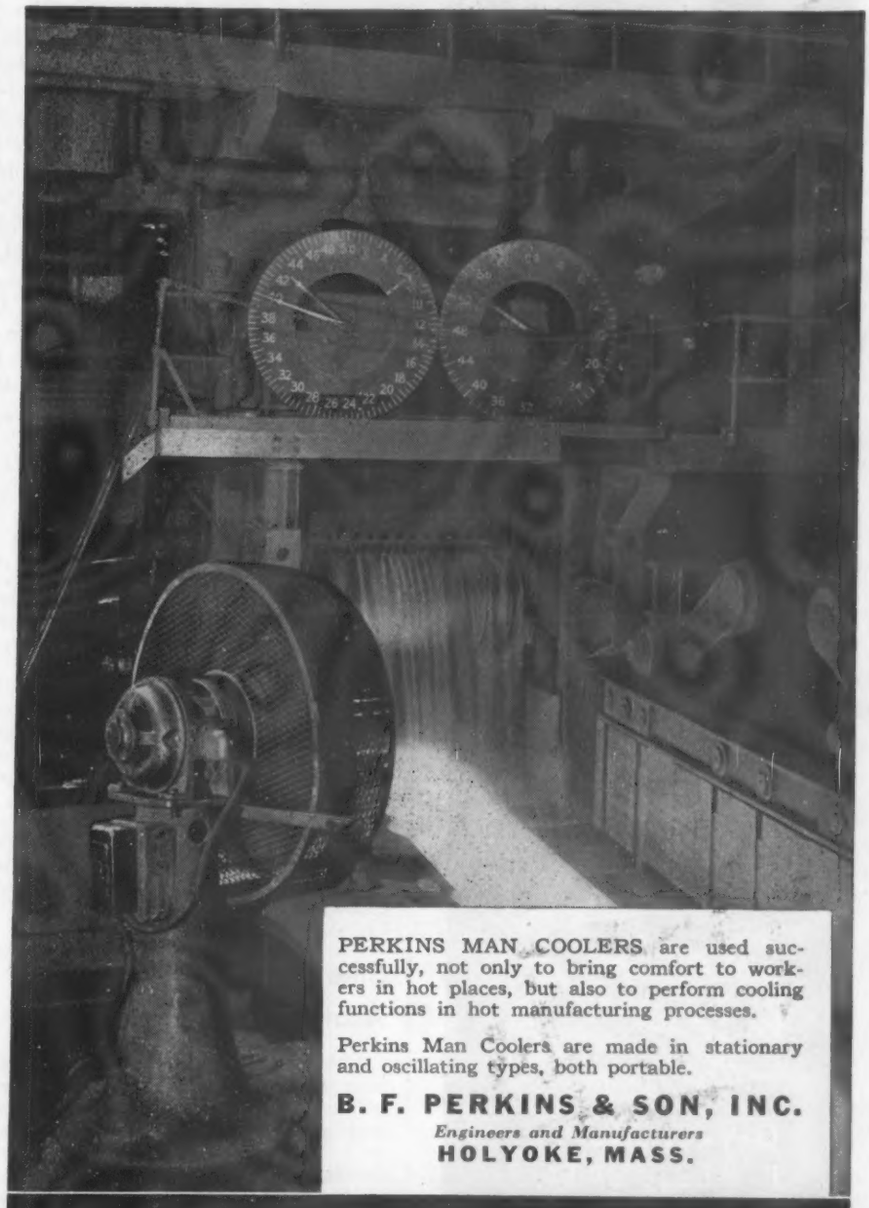
Warehouse Prices, Page 202

Pittsburgh — Steel distributors see little possibility of obtaining any delivery preference on mill rolling schedules to permit rebuilding of inventories badly depleted during the steel strike. Some interests believe inventories will not be restored to normal until early next year. In some products, such as galvanized sheets, light gage hot and cold-rolled sheets and certain structural sections, stocks are non-existent. They point out that inventories will be further reduced the next few weeks, despite continued rationing of available stocks, because of the necessary time lag before full mill operations can be resumed. Although not yet officially announced by OPA, some steel distributors expect whatever price increase is finally established on basic steel products will be applicable on steel warehouse stocks. The increase is not expected to be retroactive to Feb. 15, as in the case of basic steel producers, but effective with OPA announcement on the product breakdown of steel price increases.

New York — Demand for steel from warehouse has slackened, partly because of lack of wanted steel. Replacements by mills are coming in slowly; probably not before next month will this volume be near normal. For this reason, numerous distributors continue on a forced rationing basis.

Seattle — Jobbers report sheets still critical, deliveries set for six to eight months. Plates 3/16-inch and lighter, also are scarce but heavier gages are available to some extent from shipyard surplus. Shapes continue scarce. Demand is firm and insistent. Stocks are unusually low.

Boston — In passing on increased mill prices only, warehouses will absorb latest wage advances, estimated to approximate $1 a ton; since price ceilings trucking costs probably average $2 and



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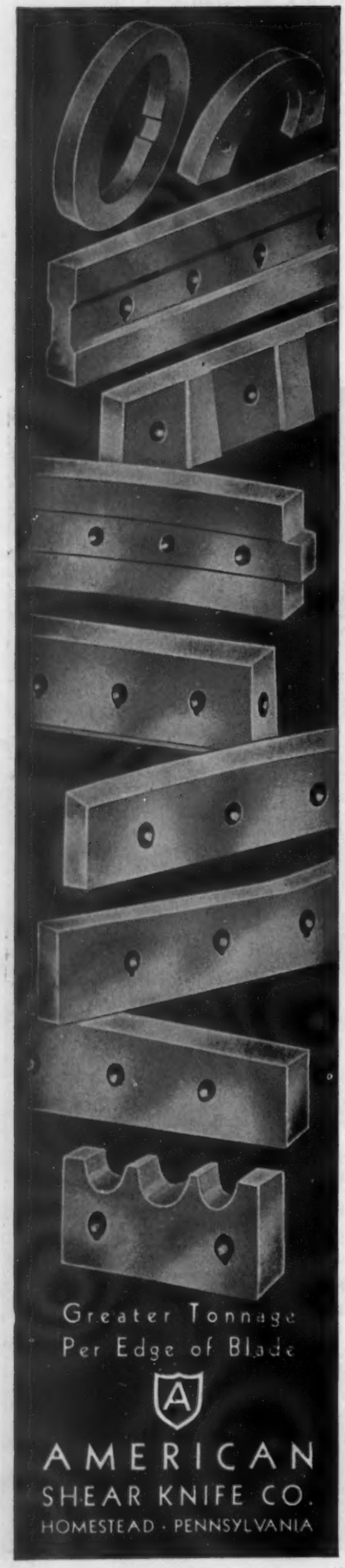


former labor and salary advances $1.50 a ton. Price advance with distributors will not be retroactive, but is of March 1. Sales volume has slackened, due to lack of numerous wanted products; only in slower moving steels and specialties in some cases are warehouse inventories in approximate balance.

Effect of Steel Increase On Costs Not Uniform

(*Concluded from Page* 93)

after it disposes of the major steel pricing questions. The agency is understood to be drawing up a list of steel fabricators with a view to removing the confusion in industry as to what type of manufacturer comes under the classification of fabricator. Among those scheduled to be put on this list, it is reported, are manufacturers of cans, drums, containers, concrete reinforcing bars, structural steel, fasteners, screws, bolts, culverts and railroad track bolts. Manufacturers of such items as hatchets, curtain rods, wire fence, hammers and screens, it was said, will not likely be considered fabricators. As a general thing, it was reported, OPA in determining which firms are fabricators, will act on the theory that any steel product now controlled by the Metals Branch of OPA falls under the new steel wage-price regulations.

Birmingham Mills Resume Production at Fast Pace

Birmingham—Steel ingot production is making a quicker comeback in this district than most observers had predicted.

Last week saw 8 of Tennessee Coal, Iron & Railroad Co.'s 9 blast furnaces in operation, and 8 open hearths each at Ensley and Fairfield. Ingot rate of 95 per cent of capacity is likely to be reached soon.

Five of the company's 7 batteries of coke ovens are being pushed, and near normal conditions probably will be reached by the middle of the third week following the strike.

Steel Supply Pinch More Acute in Chicago Area

Chicago — Although two full weeks have elapsed since the steel strike ended and production has recovered more rapidly than anticipated, many consumers of steel in this district are just now feeling the real pinch of shortage. This is because inventories were adequate for full or scaled-down operations over a six-week period but now are at the point of exhaustion.

During first week after end of the strike, steel plants were occupied in getting productive facilities warmed up and readied. Spurt in output came during the second week, but from a few days to several weeks are required for finished steel to reach shipping departments. Furthermore, in line with distribution policy outlined by CPA, shipments are being fanned out to provide supplies to the maximum number of users. This results in consumers' receipts being meager.

Steelmaking operations in this district last week were at 61 per cent of capacity, compared with 20 per cent the week before. Blast furnace production has been restored to the point where adequate hot metal is assured. As of last week end, 35 of the district's 41 stacks were in blast, compared with 22 the week before, nine during the four weeks of the strike, and 35 in the period preceding the strike.

It is probable that steel production here will not at any time soon attain the level which prevailed before the strike. Now that higher wage rates are in effect, it is expected mills will adhere as closely as possible to the 40-hour work week, even at the expense of steel production.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

10,500 tons, Cerritos Channel bridge, Terminal Island, San Pedro, Calif., to American Bridge Co., Pittsburgh.

3360 tons, bridges 1728 and 1730, Point Pleasant, W. Va., for Baltimore & Ohio railroad, to American Bridge Co., Pittsburgh.

500 tons, factory building, Aurora, Ill., for Barber-Greene Co., to Mississippi Valley Structural Steel Co., Decatur, Ill., Sessions Engineering Co., Chicago, engineers.

500 tons, extension to power plant, La Crosse, Wis., for Northern States Power Co., to Milwaukee Bridge Co., Milwaukee.

450 tons, factory addition, Rushville, Ind., for International Furniture Co., to American Bridge Co., Pittsburgh.

400 tons, mill building, Dartmouth Woolen Mills Co., Claremont, N. H., to Phoenix Bridge Co., Phoenixville, Pa.

225 tons, wholesale and delivery building, St. Louis, for Famous Bar Co., to Mississippi Valley Structural Steel Co., Decatur, Ill.; Westlake Construction Co., St. Louis, contractor; bids Jan. 10.

200 tons, project 3258, Orange, Tex., for E. I. du Pont de Nemours & Co. Inc., to Virginia Bridge Co., Roanoke, Va.

125 tons, foundry and office building, Bluffton, Ind., for Sterling Casting Corp., to Indiana Bridge Co., Muncie, Ind.; A. C. Wermuth, Ft. Wayne, Ind., contractor.

140 tons, stock racks for A. M. Castle & Co. warehouse, Seattle, to Leckenby Structural Steel Co., Seattle.

100 tons, warehouse, Nashua, N. H., to Phoenix Bridge Co., Phoenixville, Pa.

STRUCTURAL STEEL PENDING

6000 tons, engine manufacturing plant, Peoria, Ill., for Caterpillar Tractor Co.

4000 tons, Bank of America, San Francisco.

3000 tons, transmission towers, Oroville, Calif., for state.

527 tons, bridge spans, various locations in Oklahoma, for state.

400 tons, I-beam bridges in Westmoreland county and 150 tons for a viaduct in Lackawanna county, Pennsylvania; bids March 12 to Pennsylvania state highway commission.

290 tons, miscellaneous including 144 tons sheet and H-piling, intake crib, Waukegan, Ill., for Public Service Co. of Northern Illinois; bids Feb. 26.

280, dried pulp bins, Salt Lake City, Utah.

250 tons, building for Real Estate Trust Co., Philadelphia.

250 tons, warehouse, Florida Wholesale Grocery Co., Miami, Fla.

200 tons, coal trestle spans, Reading Co., Philadelphia.

165 tons, bridge in Lackawanna county, Pennsylvania; bids March 19 to Pennsylvania state highway commission.

REINFORCING BARS . . .

REINFORCED BARS PLACED

525 tons, Spa creek bridge, Annapolis, Md., to Bethlehem Steel Co., Bethlehem, Pa., through McLean Construction Co., contractors.

500 tons, Potomac Electric power plant, Washington, to Bethlehem Steel Co., Bethlehem, Pa., through Stone & Webster, New York, contractors.

300 tons, bridge over Anacostia river, Washington, to Bethlehem Steel Co., Bethlehem, Pa., through Dravo Corp., Pittsburgh.

210 tons, highway construction, Linn county, Iowa, for state highway commission, to Bethlehem Steel Co., Bethlehem, Pa.; Central Engineering Co., Davenport, Iowa, contractor; bids Jan. 8.

160 tons, Allied Paper Co., Kalamazoo, Mich., to Joseph T. Ryerson & Son, Inc., Chicago.

130 tons, expansion, Lakeview, Wis., for Kimberly-Clark Corp., to Cook & Brown Lime Co., Oshkosh, Wis.

REINFORCED BARS PENDING

2000 tons, Merriman dam, Delaware aqueduct, Lackawack, N. Y., contract 390; bids in.

1200 tons, superstructure, Elliott Houses Inc., New York Housing Authority, New York City, bids asked; this follows placing of 200 tons for foundation work previously.

950 tons, Los Angeles river improvement, North Broadway to Alhambra avenue; bids March 13, U. S. engineer, Los Angeles.

700 tons, science building and liberal arts and music building, Boston University, Boston.

485 tons, Dewey dam, between West Virginia and Kentucky state lines; bids received by Army engineers at Cincinnati and Huntington, W. Va., March 1.

385 tons, new building, Glen Ellyn, Ill., for College for Catholic Foreign Missions; bids Dec. 18; project postponed to September.

315 tons, addition, Estherville, Iowa, for Tobin Packing Co.

300 tons, factory, Chicago, for Consolidated Biscuit Co.; bids Feb. 22.

260 tons, building, Chicago, for American Colortype Co.; general contract to S. N. Nielsen Co., Chicago.

170 tons, expansion, buildings 51 and 52, Laporte, Ind., for Allis-Chalmers Mfg. Co.; bids taken Feb. 14 rejected, plans under revision.

160 tons, factory, Port Washington, Wis., for Harnischfeger Corp.

160 tons, new building, Moorehead, Minn., for Concordia College; bids Feb. 25.

156 tons, metallurgical building, Chicago, for Illinois Institute of Technology; bids Feb. 19.

130 tons, expansion, Chicago, for Great Lakes Plating & Japanning Co.

125 tons, courthouse, Wellington, Kans.

120 tons, new building, Charleston, Ill., for Eastern Illinois State College.

109 tons, bridge, paving and grading, sections 11 and 13, route 161, Northumberland county, Pennsylvania; bids March 5.

100 tons or more, state highway bridges in Walla Walla and Whitman counties, Washington; bids to Olympia March 12.

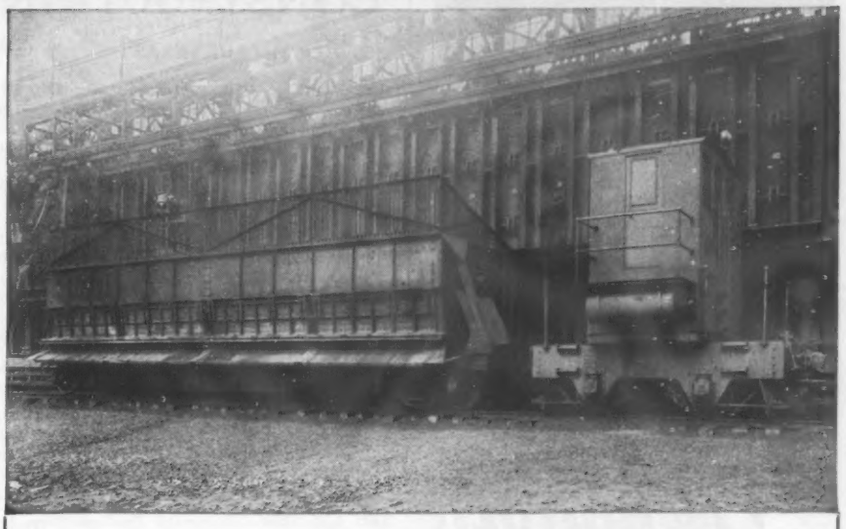
RAILS, CARS . . .

RAILROAD CARS PLACED

Gulf, Mobile & Ohio, 50 seventy-ton covered hopper cars, to Pullman-Standard Car Mfg. Co., Chicago; these were reported placed recently with another builder.

Illinois Central, 100 seventy-ton covered hopper cars, to Pullman-Standard Car Mfg. Co., Chicago.

COKE OVEN EQUIPMENT



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PIPE . . .

CAST IRON PIPE PENDING

300 tons, 18,500 feet 12 to 4-inch cast iron for Bremerton, Wash.; bids March 16.

100 tons or more, District 49, King county, Washington; Thorburn & Logozo, Seattle, low, $12,578.

CONSTRUCTION AND ENTERPRISE

ARKANSAS

FORT SMITH, ARK.—American Can Co., 104 South Michigan Ave., Chicago, Gordon H. Kellogg, vice president, plans a $1 million can factory here to supply vegetable packers in Arkansas and Oklahoma.

CALIFORNIA

BERKELEY, CALIF.—Pure Carbonic Inc., Virginia and Third Sts., T. Wayne Gibson, vice president, has let contract to Fluor Corp., Third and Virginia Sts., for a plant building, office and garage, to cost about $750,000.

LOS ANGELES—Precision Specialties Inc. has been incorporated with 2400 shares no par value, represented by Louis Naiditch, William Fox Bldg.

LOS ANGELES—Skycraft Industries Inc. has been incorporated with $250,000 capital, represented by Charles T. Lester, 548 North Spring St.

LOS ANGELES—Automatic Products Corp. has been incorporated with $500,000 capital, represented by Erwin H. Haas, 548 South Spring St.

CONNECTICUT

BRIDGEPORT, CONN.—Underwood, Elliot-Fisher Co., 575 Broad St., will let contract soon for a boiler house costing about $94,000. Lockwood-Greene Inc., 10 Rockefeller plaza, New York, is engineer.

HARTFORD, CONN.—Veeder-Root Inc., Sargeant and Garden Sts., has let contract to Industrial Construction Co., 721 Main St., for a plant addition to cost about $325,000. Buck & Buck, 650 Main St., are engineers.

NEW BRITAIN, CONN.—Fafnir Bearing Co. has awarded contract for 90,000-square foot plant addition, one story, to cost about $350,000.

ILLINOIS

AURORA, ILL.—Independent Pneumatic Tool Co., 600 West Jackson Blvd., Chicago, has plans under way by A. Epstein, 200 West Pershing Rd., Chicago, for a one and two-story manufacturing and office building.

CHICAGO—Precision Scientific Co., 1750 North Springfield St., has let contract to Continental Construction Co., 340 North Central Ave., for a one-story 267 x 573-foot plant, estimated to cost about $450,000. W. Fred Dolke, 189 West Madison St., is architect.

CHICAGO—Pyle-National Co., 1334 North Kostner Ave., has let contract to E. L. Hallbauer Construction Co., 452 Belden St., for a two-story 40 x 85-foot pattern shop, to cost about $40,000. A. Swanson & Associates, 540 North Michigan Ave., are architects.

DE KALB, ILL.—Rudolph Wurlitzer Co. is having plans drawn by Bradley & Bradley, Brown Bldg., Rockford, Ill., for a one-story 151 x 260-foot plant addition here, to cost about $200,000, with equipment.

HARVEY, ILL.—Sinclair Refining Co., 135 South LaSalle St., Chicago, has let contract to Austin Co., 510 North Dearborn St., Chicago, for research laboratories on 38-acre site.

PEORIA, ILL.—Hiram Walker & Sons, distillers, have let contract to Val Jobst & Sons, Peoria, for a ten-story rack house 125 x 240 feet, with capacity for 125,000 barrels. Racks will be of steel.

PEORIA, ILL.—Pabst Brewing Co., Milwaukee, has let contract to James McHugh Construction Co., 6449 South Park St., Chicago, for a two-story office building and four-story laboratory, to cost about $2,500,000.

IOWA

HAMPTON, IOWA—Federated Co-Operative Power Association plans two generating stations to cost about $374,000, with equipment.

MUSCATINE, IOWA—City has let contract to Babcock & Wilcox Co., 140 South Dearborn St., Chicago, at $287,000, for a steam power generating unit at municipal power plant.

VILLISCA, IOWA—City, C. G. Hilleary, secretary, board of trustees, is considering bids on a municipal light and power plant addition, with diesel engine generating unit, switchboard extensions and steel fuel oil storage tanks. A. S. Harrington, Omaha, Nebr., is consulting engineer.

MAINE

PORTLAND, ME.—Burnham & Morrill Co., 45 Water St., plans a two-story 40 x 108-foot plant addition to cost about $40,000. John Howard, 187 Middle St., is architect.

MARYLAND

CUMBERLAND, MD.—Air Reduction Co. Inc., Lincoln Bldg., New York, has let contract to George F. Hazelwood Co., Howard St., for a chemical plant costing about $155,000.

MASSACHUSETTS

SPRINGFIELD, MASS.—Springfield Ice & Fuel Co., 251 Hickory St., has let contract to J. G. Roy & Sons Co., 21 Silver St., for a one-story 105 x 155-foot ice plant, estimated to cost about $40,000.

MICHIGAN

COLDWATER, MICH.—Federal Mogul Corp., Coldwater, is having plans drawn by Robinson, Campau & Crowe Inc., 760 Michigan Trust Bldg., Grand Rapids, Mich., for a warehouse to cost about $250,000.

DETROIT—Weldit Inc. has let contract to A. N. Hickson, 16565 Ardmore St., for a two-story plant and office to cost about $50,000.

PORT HURON, MICH.—City, City Hall, has let contract to Chicago Bridge & Iron Co., 332 South Michigan Ave., Chicago, for a 1 million-gallon and a 500,000-gallon elevated steel water tank, to cost about $150,000.

SAGINAW, MICH.—Chevrolet Motor Division of General Motors Corp., Saginaw, has let contract to Spence Bros., Saginaw, for a gray iron foundry addition to cost about $250,000.

MINNESOTA

MINNEAPOLIS—American Refrigerator & Machine Co., 615 North Third St., has let contract to Standard Construction Co., 604 National Bldg., for a one-story 140 x 200-foot plant addition, to cost about $120,000. Long & Thorshov, 1200 Second Ave S., are architects.

MISSOURI

ST. LOUIS — Maloney Electric Co., 5390 Bircher Rd., manufacturer of electrical equipment, has let contract to Hercules Construction Co., 8808 Ladue Rd., St. Louis, for a one-story 100 x 163-foot warehouse.

ST. LOUIS — Modern Engineering Co., 3401 West Pine St., plans a plant addition for manufacture of nonfreezing welding gas, etc.

ST. LOUIS—St. Louis Boat & Motor Co., 2801

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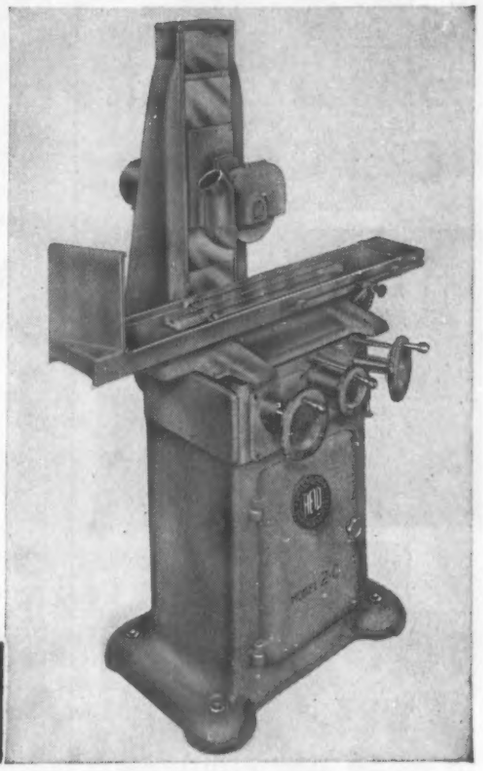

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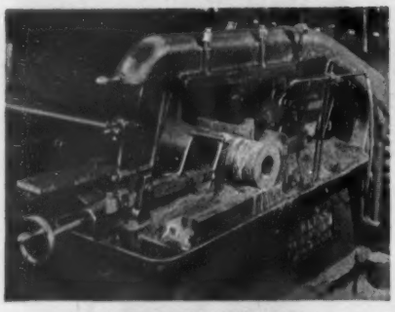

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North Broadway, L. C. Wickett, president, will take bids early in the summer for a three-story boatbuilding plant at North Broadway near Branch St., to cost about $800,000.

ST. LOUIS—Wagner Electric Corp., 6400 Plymouth Ave., has let contract for three new plant buildings to Hercules Construction Co., 8808 Ladue Rd., to cost over $300,000; buildings will be one-story 40 x 60 feet, three-story 120 x 205 feet and three-story 124 x 125 feet.

MONTANA

GREAT FALLS, MONT.—Union Construction Co. is low at $52,585 for the Dodson pumping unit and other items for the Milk river project near Dodson, a Bureau of Reclamation job.

NEW JERSEY

CAMDEN, N. J.—U. S. Gasket Co., Market and Fifth Sts., is taking bids through Radey & MacNelly, 101 North Seventh St., for a manufacturing building costing about $40,000.

NEW YORK

BROOKLYN, N. Y.—Associated Heat & Fuel Co., 200 Morgan Ave., will let contract soon for a fuel oil terminal to cost about $250,000. O. J. Sambach, 51 Chambers St., New York, is engineer.

OHIO

ASHLAND, O.—Simmons Mfg. Co., 222 Ohio St., manufacturer of automobile parts, is building a plant addition of about 12,000 square feet to increase manufacturing space.

CANTON, O.—Canton Malleable Iron Co., 2408 Thirteenth St. NE., has let contract to Warren Hoffman Co., Mellet Bldg., for a one-story plant addition to cost about $40,000.

CLEVELAND—Cleveland Electric Illuminating Co., 75 Public Square, Elmer L. Lindseth, president, has construction program for 1946 involving about $9 million, including substation on 132,000-volt line, six distributing substations and replacements and improvements at Canal Rd. steam plant.

CLEVELAND—Tremcast Co., Frank Trembowski, president, has let contract for tool and die shop at 4060 East 78th St., 46 x 100 feet.

CLEVELAND—Berger Machine & Mfg. Co., 9002 Madison Ave., A. H. Berger, president, has larger plant under construction to double manufacturing space to 24,000 square feet. Gas and electric stoves will be added to present line of oil stoves and much new equipment will be installed.

CLEVELAND — Universal Wire Spring Co., 2260 East 69th St., has let contract to D. W. Rankin, 1836 Euclid Ave., for a two-story 58 x 161-foot and a one-story 18 x 30-foot addition, to cost about $50,000. Christian, Schwartzenberg & Gaede, 1836 Euclid Ave., are engineers.

CLEVELAND—Manor Die Cast Corp., recently incorporated will build a die casting plant 90 x 120 feet at Manor Ave. and East 89th St. F. A. Corrao, 8909 Dickens Ave., is head of the company.

CLEVELAND—Palmer Mfg. Co., has been incorporated to manufacture tools, gages, dies, jigs and fixtures. Steven W. Kormendy, attorney, Society for Savings Bldg., is representative.

CLEVELAND—U. S. Steel Supply Co., subsidiary of United States Steel Corp. will build a warehouse 380 x 450 feet on nine-acre site at East 70th St. and Bessemer Ave., replacing present plant at 1394 East 39th St.

DAYTON, O.—W. B. W. Tool Co., Leo St., has let contract to I. F. Weber Co., Commercial Bldg., for a 62 x 125-foot plant addition and remodeling existing plant, at cost of about $70,000. H. C. Griffith, Canby Bldg., is architect.

YOUNGSTOWN—L. D. Cochran, 3447 Logan Rd., is president of L. D. Cochran Co., recently organized by local interests to establish a sheet metal and stamping plant in Columbiana county, requiring about 6000 square feet floor space, for which presses, ovens and other equipment will be bought. Richard Schumann, Central Tower Bldg., attorney, is secretary.

OREGON

SALEM, OREG.—Sound Construction & Engineering Co., Seattle, is low bidder for construction of a million-dollar frozen foods plant at Ontario, Oreg., for the Bridgeford Co.

PENNSYLVANIA

JEANNETTE, PA.—Victory Glass Co. has let contract to Branna Construction Co., 406 Bessemer Bldg., Pittsburgh, for a one-story 88 x 116-foot furnace building, to cost about $40,000. A. W. Schmidt, Fourth Ave., Pittsburgh, is engineer.

PITTSBURGH—Pittsburgh Screw & Bolt Co., Preble Ave., plans a one-story 100 x 200-foot plant to cost about $150,000. G. Smith is company engineer.

WASHINGTON, PA.—Washington Steel Corp. has let contract to Washington Engineering & Construction Co., Penn and Oakland Sts., for alterations to mills, to cost about $150,000. J. Hopkins, City Savings Bank, Alliance, O., is engineer.

SOUTHAMPTON, PA.—Pennsylvania Frosted Foods Corp., 45 West Court St., has let contract to L. R. Comly, Hulmeville, Pa., for a frozen foods plant to cost about $250,000.

RHODE ISLAND

WARWICK, R. I.—Lloyd Mfg. Co. Inc., West Shore Rd., will let contract soon for a one-story 70 x 100-foot plant building. Albert Harkness, 1528 Industrial Trust Bldg., Providence, R. I., is architect.

TENNESSEE

MEMPHIS, TENN. — International Harvester Co. Inc., 180 North Michigan Ave., Chicago, has let contract to Gage Structural Steel Co., same address, for structural steel work on plant north of Wolf river.

WASHINGTON

SEATTLE—Fentron Steel Works, 1401 West Garfield St., will build a one-story 150 x 193-foot steel fabricating plant at 2850 Market St., to cost about $65,000. Bain, Overturf, Turner & Associates, Hoge Bldg., are architects.

SEATTLE—Troy Laundry Co., 307 Fairview Ave. North, opened bids Feb. 28 for a $35,000 plant addition 40 x 162 feet, to house boiler room and water softening plant.

TACOMA, WASH.—Tacoma Engineering & Machine Works, Inc. has been organized by F. G. Butcher, 3522 South Alaska St., and associates.

WISCONSIN

MANITOWOC, WIS.—Aluminum Goods Mfg. Co., 1502 Washington St., plans one-story 77 x 145-foot and 27 x 63-foot rolling mill additions. W. Fred Dolke, 189 West Madison St., Chicago, is engineer.

MILWAUKEE—Stolper Steel Products Corp., 3258 West Fond du Lac Ave., has bought 12-acre site and plans erection of a plant.

MILWAUKEE—G. R. Worth-Harmes Gear & Machinery Works Inc., 2970 North Weil St. is having plans drawn by R. Razall, 1420 East Capitol Drive, for a one-story plant addition 82 x 90 feet.

PORT WASHINGTON, WIS.—Harnischfeger Corp., 4400 West National Ave., Milwaukee, has let contract to Hunzinger Construction Co., 4541 North 124th St., Milwaukee, for a one-story 180 x 360-foot plant building estimated to cost about $300,000. H. I. Messmer, 231 West Wisconsin Ave., Milwaukee, is architect.

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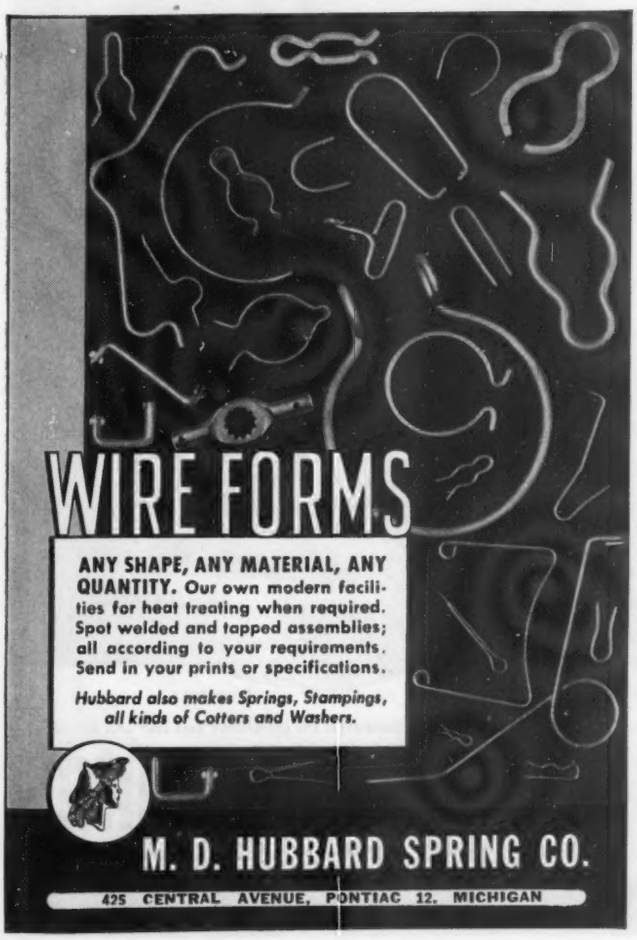

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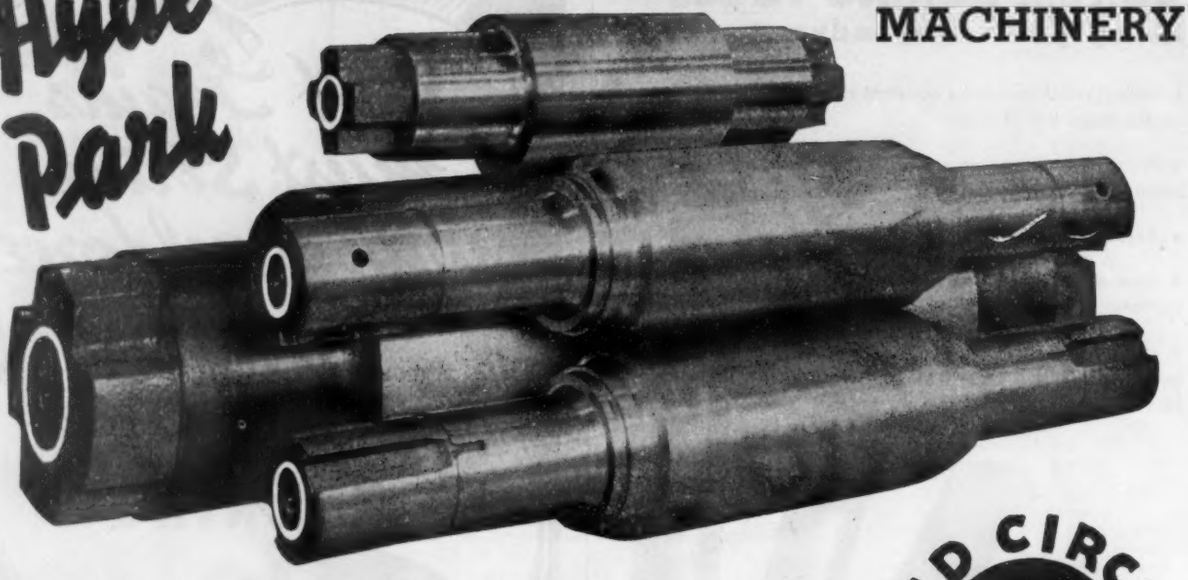

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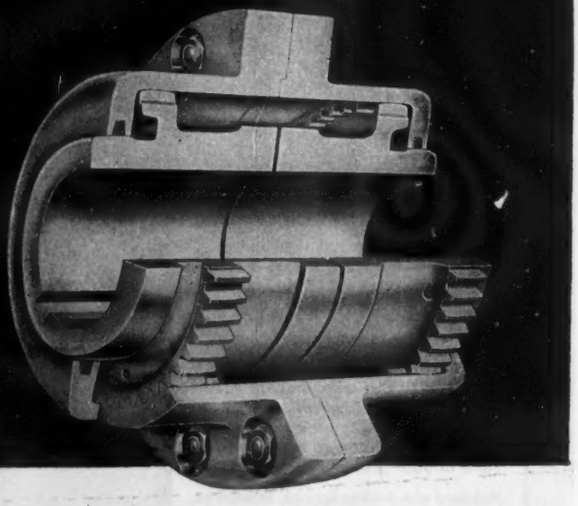

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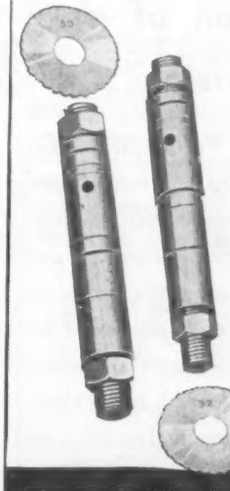

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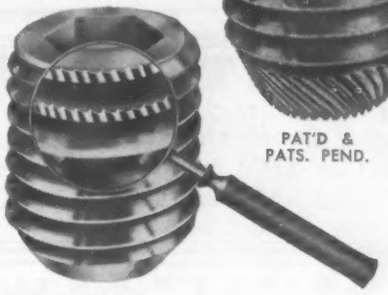

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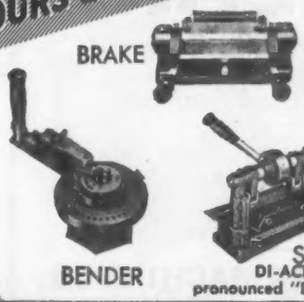

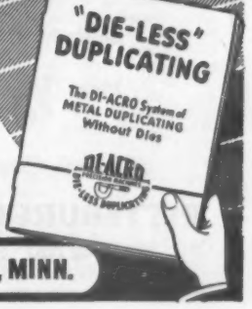

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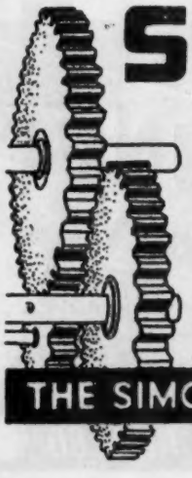

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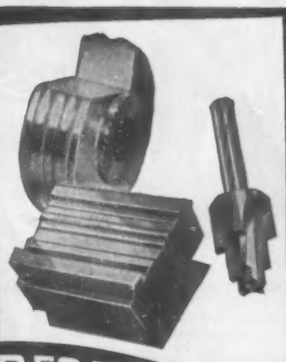

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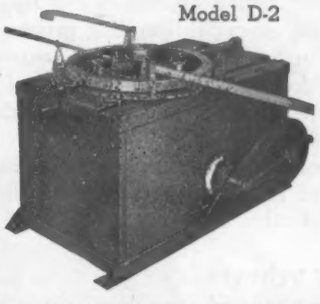

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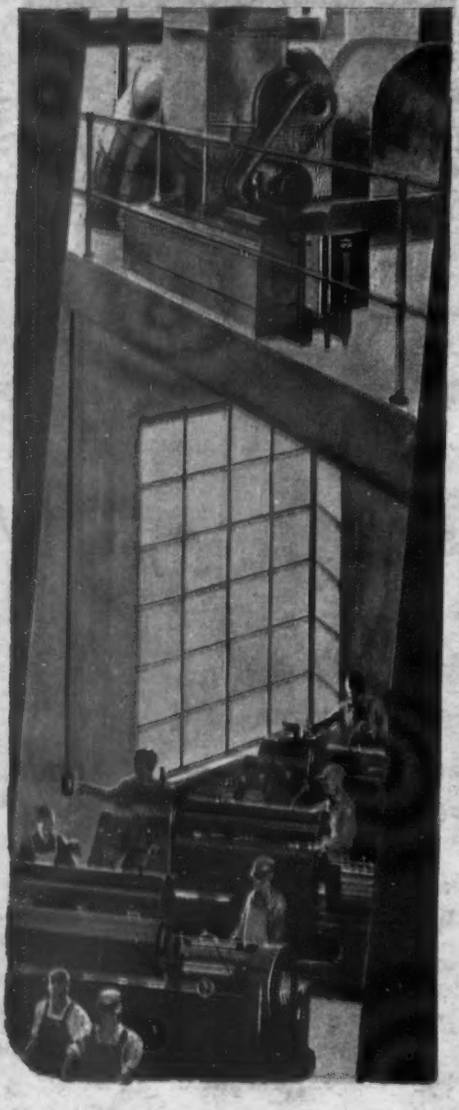

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